

April 14, 1959

I. W. DYER
AIR FLOW SEAL FOR AIR FILTER HAVING
AN EXPANSIBLE-CONTRACTIBLE
AIR CLEANING WEB

2,881,861

Filed Feb. 18, 1957

2 Sheets-Sheet 1

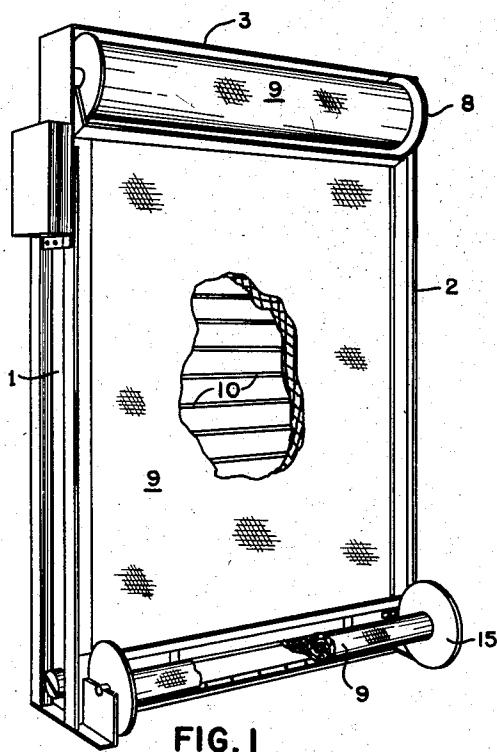


FIG. 1

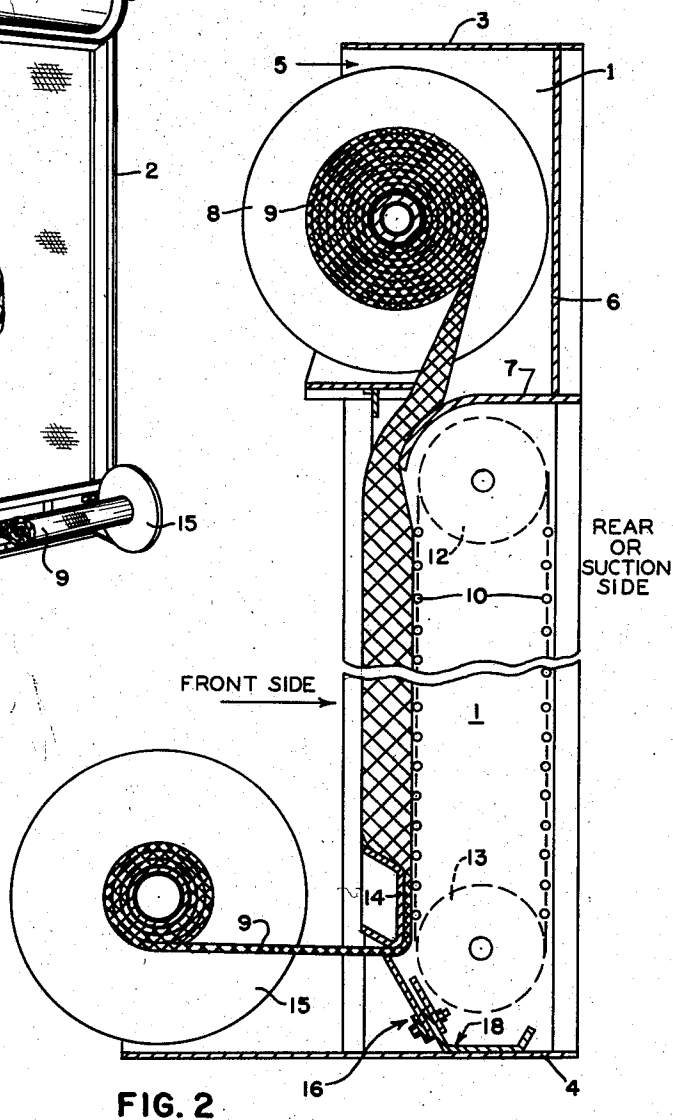


FIG. 2

INVENTOR.

IVAN W. DYER

BY

Arthur Robert

ATTORNEY

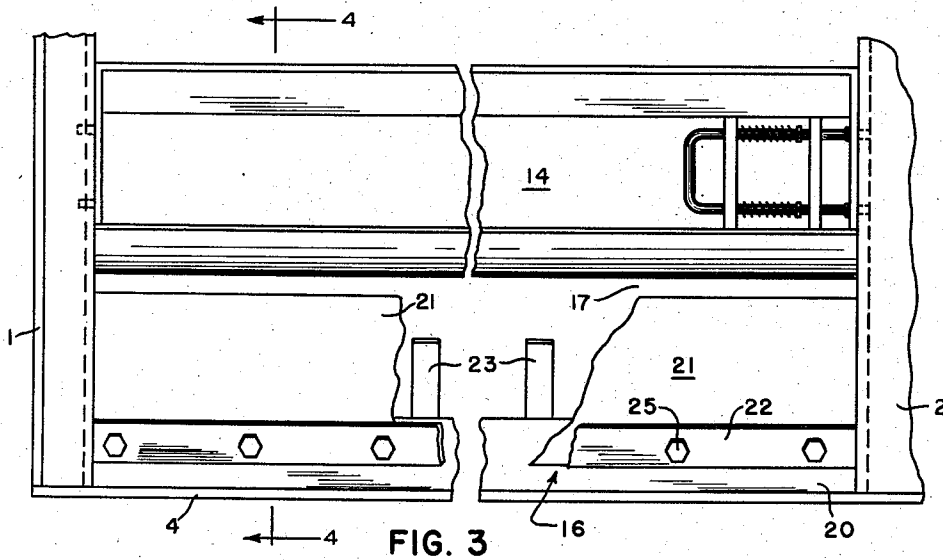
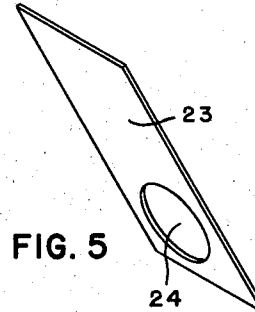
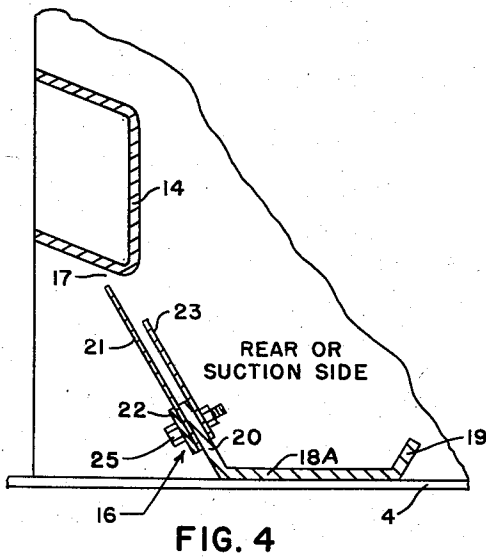
April 14, 1959

I. W. DYER
AIR FLOW SEAL FOR AIR FILTER HAVING
AN EXPANSIBLE-CONTRACTIBLE
AIR CLEANING WEB

2,881,861

Filed Feb. 18, 1957

2 Sheets-Sheet 2



INVENTOR.
IVAN W. DYER
BY *Arthur Robert*
ATTORNEY

1

2,881,861

AIR FLOW SEAL FOR AIR FILTER HAVING AN EXPANSIBLE-CONTRACTIBLE AIR CLEANING WEB

Ivan W. Dyer, Louisville, Ky., assignor to American Air Filter Company, Inc., Louisville, Ky., a corporation of Delaware

Application February 18, 1957, Serial No. 640,715

3 Claims. (Cl. 183—62)

This invention relates to an air flow seal for automatic ventilating air filters of the disposable medium type.

The type of air filter, in which my invention is particularly useful, is disclosed and claimed in U.S. Patent No. 2,807,330, wherein an air cleaning web extends from a supply zone through an air cleaning zone into a discharge zone. This web is of a resilient, self-expanding type, such as the expanded filamentous fiber glass mat or web shown in U.S. Jackson application Serial No. 329,821, now Patent No. 2,798,531 dated July 9, 1957, and is supplied in a compressed condition to the supply zone, moved through the air cleaning zone in an operatively expanded condition and finally directed into the discharge zone where it is flattened and manipulated into a compact package which facilitates its disposal.

The flattening and manipulating means include: means flattening the web in a narrow compression slot formed, usually at the lower end of the porous conveyor which moves the web downwardly, by an outer face portion of the conveyor and the relatively flat face of a panel spaced slightly therefrom; and means operative, as the compressed or flattened web emerges from the compression slot, to pull it around the lower edge of the panel through a fixed air sealing slot associated with that panel and to wind it in a compressed condition on a rewind spool. The rewind spool is driven through a slip friction clutch delivering torque of a magnitude sufficient to maintain and rewind the web in a compressed condition but insufficient to cause the expanded web, beyond the compression slot, to neck down in width and thereby destroy the air seal along its vertical edges.

A difficulty sometimes experienced with such an arrangement is that the web tends to pile up against the fixed slot forming the air seal. This difficulty is not readily apparent at first because the rewind spool may be pulling and rewinding the web at an imperceptibly decreasing rate while, at the same time, the web is piling up at an increasing rate behind the slot. This condition ultimately results in the rewind spool stalling; and any additional web then moved downwardly by the conveyor piles up on the downstream side of the fixed slot.

The principal object of the present invention is to prevent the web from piling up.

A further object is the provision of improved sealing structure in which pile-up of the web does not occur.

While the principal reason for the pile-up of web is not entirely clear, it is believed that variations in the compressibility and dust loading of the web result, at times, in a web condition such that the resistance of the fixed slot to the passage of the web varies in accordance with the web condition.

To avoid the difficulty, I provide a structure wherein the resistance of the slot to the passage of the web is relatively independent of the varying web condition. This structure, in accordance with my invention, includes a slot having one side thereof formed by a relatively long, flexible flap mounted with one edge positioned to en-

2

gage the web occupying the slot. This flap is inclined with respect to the web face so that the web-engaging edge will yield more readily in the direction of web travel than in the opposite direction, and restraining means are provided adjacent one face of the flap to restrict flap movement in a direction opposite to web travel through the slot.

An embodiment of my invention is illustrated in the accompanying drawing wherein:

Figure 1 is a partly broken perspective view of the filter;

Figure 2 is a somewhat diagrammatic view showing the contour of the web, in vertical section, during its travel through the air cleaner;

Figure 3 is a fragmentary front elevation showing the upper panel and air flow seal assembly, the rewind spool and mounting means therefor being deleted for the sake of clarity;

Figure 4 is a vertical sectional view taken on line 4—4 of Figure 3; and

Figure 5 is a perspective view of one of the fingers which functions to restrain rearward bending of the flexible flap.

Referring to the drawing, a rectangular perimetric frame is formed by vertical side walls 1 and 2, and horizontal top and bottom walls 3 and 4, the frame including an air cleaning zone open on its front and rear faces to accommodate a flow of air therethrough in a direction indicated by the arrow in Figure 2. A forwardly open supply chamber 5 is formed at the top of the frame by a vertical rear wall 6 and a horizontal floor 7 cooperating with the walls 1—3, this chamber including means which carry a rotatable supply roll 8 of compressed web 9. This web is fed downwardly across the front edge of floor 7 into the air cleaning zone and, as best seen in Figure 2, the web, due to its inherent resilience, expands to its operating air flow depth as it enters the air cleaning zone, and maintains this depth during its downward travel to the discharge zone.

As the web accumulates a dust load in the air cleaning zone, it is periodically moved or shifted downwardly, from the supply zone, through the air cleaning zone, and into the discharge zone, by a porous conveyor 10, which extends around an upper and lower sprocket 12 and 13 respectively. The front face of the conveyor, in addition to shifting the web when moved, supports the filter web against the force of air flow from front to rear through the air cleaning zone.

Upon entering the discharge zone, the web 9 is compressed or flattened as it passes between the rear surface of compression panel 14 and the conveyor. It is then pulled around the lower edge of panel 14 and forwardly through an air sealing slot, separating the clean air space on the downstream side of the web from the dirty air space on the upstream side thereof, to the rewind roll 15 where it is wound into a compact package, the pull exerted by the rewind roll serving to maintain the web in its flattened condition during this movement.

The air sealing slot, separating the clean air space from the dirty air space in the area where the web passes from the air cleaning zone to the discharge zone, has an upper edge formed by the compression panel 14 and a lower edge formed by an air flow seal assembly generally designated by numeral 16. This assembly is mounted to extend below and slant rearwardly from the compression panel 14, and forms, with the lower edge of the panel, a horizontal elongated slot 17 through which the flattened web 9 passes to the rewind roll 15.

The base of the assembly, as illustrated, is in the form of an open-ended pan 18 extending between frame side walls 1 and 2 and having a bottom 18A, which is suitably

3

secured to the frame bottom 4, and rear and front flanges 19 and 20 flaring upwardly therefrom.

The front flange 20 has mounted thereon a rectangular, flexible sheet or flap 21 extending laterally between the side walls 1 and 2 and upwardly so that its upper edge is in substantial parallel alignment with, and spaced downwardly from, the lower edge or corner of compression panel 14 to form the slot 17. The lower marginal portion of the flap 21 which laps the front flange 20 is secured thereto by being sandwiched between the front surface of the flange and a holding strip 22 which also extends between the side walls 1 and 2 of the frame.

A series of strips or fingers 23, provided with holes 24 adjacent their lower ends, are mounted in laterally spaced relationship on flange 20 to project upwardly and forwardly adjacent the rear surface of flap 21.

To secure the parts of the seal assembly into a composite structure, the front flange 20, flap 21 and strip 22 are provided with laterally-spaced, registering holes to accommodate bolts 25 which pass therethrough, and one finger 23 is secured to the rear surface of flange 20 by each bolt 25.

The flap 21 is formed of material which, while sufficiently flexible to yield or bend forwardly when its upper edge is in engagement with the moving web, does not bend or droop forwardly to any substantial degree from its own weight. A suitable material for the flap is a relatively thin sheet of polyethylene plastic which is relatively unaffected by moderate variations in temperature, moisture, or the coating composition applied to the web to increase its dust loading capacity.

When the filter is in operation, that is, with the air flowing through the web in the air cleaning zone, there exists a pressure differential on opposite sides of the filter due to the air flow resistance of the web. This pressure differential exerts a force tending to move the flap 21 rearwardly. The fingers 23 operate to restrain or limit such movement. Because of the angle at which the flap

4

is disposed relative to the web, the pressure differential also moves the upper or web engaging edge of the flexible flap yieldably into tighter engagement with the web, thus increasing the effectiveness of the seal.

5 Having described my invention, I claim:

1. In an air cleaning device employing an elongate web of expansible compressible air filtering media displaceable from a compressed condition in a supply zone through an air filtering zone to a discharge zone, an air flow seal for the web in the discharge zone comprising a compression plate disposed transverse to the direction of web advance against which one surface of said web is maintained in compressed relation, a flexible flap member disposed transverse to the direction of web advance and having one edge thereof disposed substantially parallel to said compression plate and spaced therefrom a distance permitting engagement with the other surface of said web and means positioned to restrict displacement of said flexible flap in a direction opposite to that of the direction of web displacement past said compression plate.

2. The air flow seal specified in claim 1 wherein: said flap member is inclined relatively to the web so as to form therewith an acute angle which opens in a direction opposite to the general direction of web movement through the slot.

3. The air flow seal specified in claim 1 wherein: said restraining means are in the form of individual fingers laterally-spaced along one side of said flap member.

30

References Cited in the file of this patent

UNITED STATES PATENTS

1,387,731 McVickar ----- Aug. 16, 1921
2,218,453 Mickle ----- Oct. 15, 1940

35

FOREIGN PATENTS

1,126,163 France ----- July 23, 1956