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V. R. ABRAMS

2,369,649

FLUID CLEANER

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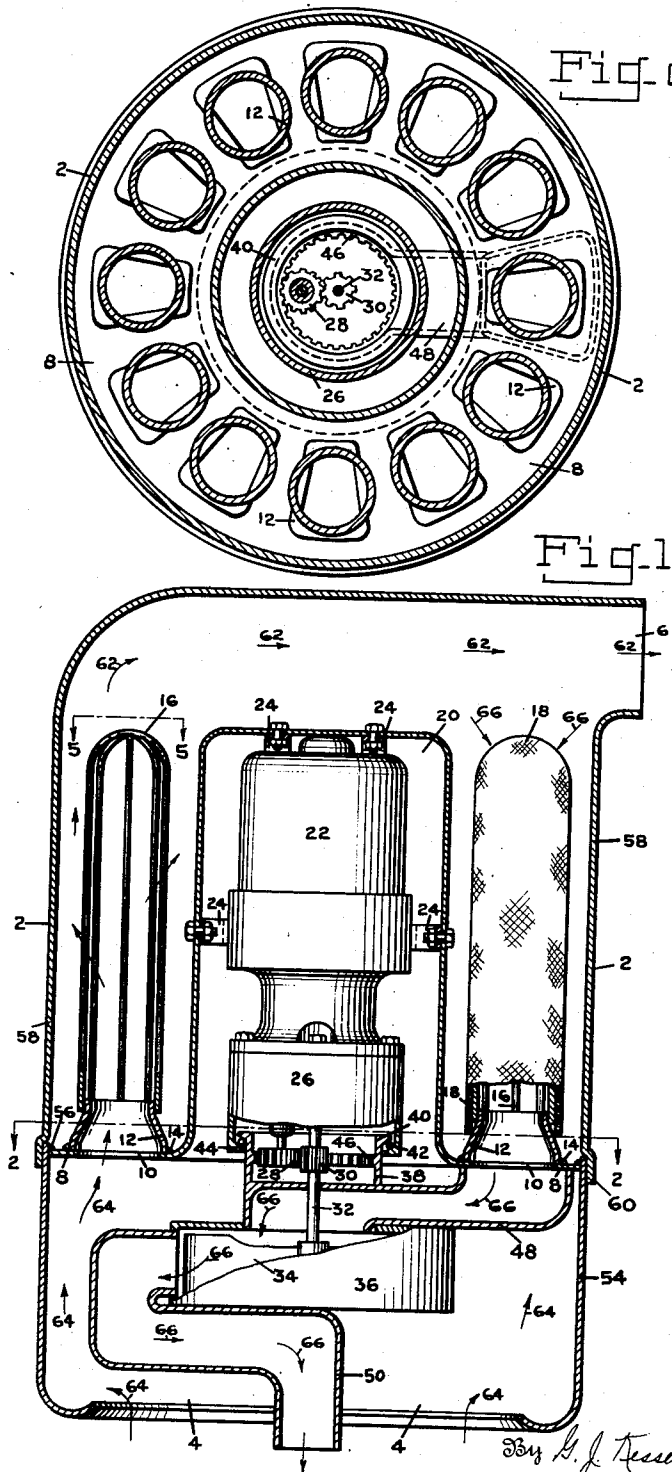


Fig. 2

Fig. 3

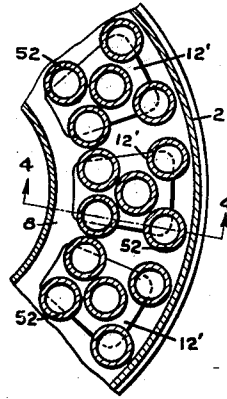


Fig. 4

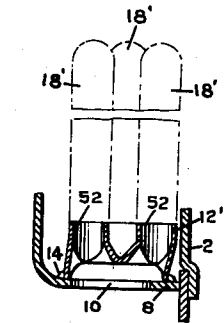
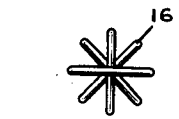


Fig. 5



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FLUID CLEANER

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3 Claims. (Cl. 183—57)

(Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757)

The invention described herein may be manufactured and used by or for the Government for governmental purposes, without the payment to me of any royalty thereon.

This invention relates to fluid cleaners, particularly to air cleaners such as are used on internal combustion engines.

Since the need for air cleaners has been recognized, engineers have sought to provide cleaners more and more efficient and reliable and requiring less attention for maintaining them in operative condition at high efficiency. It has further been recognized that a good air cleaner should be capable of operation in any position.

It is the object of this invention to provide an air cleaner which functions efficiently and reliably with a minimum of maintenance, and which will work in any position. This is accomplished by the provision of a plurality of filter units, with means for continuously cleaning the filters by reversing the flow of air through the units one at a time. The air flow reversing means comprises a motor driven fan, the intake of which is movably connected to the normal intake side of a filter unit. The fan motor is connected to provide relative rotation between the filter units and the fan connection. The flow reversal serves to clean the dirt out of the pores of the filter unit, resulting in a cleaner which will operate almost indefinitely without dismantling for cleaning. The design of the cleaner is such that the flow paths of the various air currents are not dependent upon any given position, so that the cleaner operates effectively in any position.

The specific nature of the invention as well as other objects and advantages thereof will clearly appear from a description of a preferred embodiment as shown in the accompanying drawing in which:

Fig. 1 of the drawing is a sectional elevation of a cleaner made according to the invention.

Fig. 2 in a view in section substantially on line 2—2 of Fig. 1.

Fig. 3 is a view similar to a portion of Fig. 2, but illustrating a modification of the invention.

Fig. 4 is a view in section substantially on line 4—4 of Fig. 3, and

Fig. 5 is a view looking down from line 5—5 of Fig. 1.

Referring now to the drawing in detail, a housing 2, generally circular in cross-section, is shown. The housing is provided with an air inlet opening 4 and an air outlet opening 6. Between

the inlet and outlet is disposed a partition 8, which has passages therethrough made up of perforations 10 in the partition and connectors 12 secured to the partition over the perforations on the outlet side of the partition. Connectors 12 may be secured to the partition by any suitable means such as weld 14. To them, in turn, are secured, as by welding, a plurality of wires making a frame 16, which is adapted to support an air pervious material 18 such as any suitable filter cloth, which will preferably be in the form of a bag closed at one end and adapted to be pulled over the wire frame. In Fig. 1, the filter unit on the left is shown with the bag removed to indicate more clearly the structure of frame 16.

Disposed substantially centrally of and defined by the partition is a chamber 20, in which is disposed a motive power source 22, such as an electric motor, which is secured to the partition by the nut and bolt assemblies 24 as shown. Any suitable speed reduction device, in housing 26, may be connected to the drive shaft of the power source 22. Inasmuch as the details of the speed reduction device form no part of this invention, the showing is merely schematic. The power from the device is transmitted to gear 28, which meshes with gear 30 on shaft 32, to which the blower or fan 34 is secured.

Fan 34 runs in a housing 36 which is suspended from the motor 22 by the flanged cylindrical extension 38. The flange 40 of extension 38 rests on ball-bearings 42 which in turn are supported on the inwardly turned flange 44 of gear housing 26. Extension 38 is provided with an interval ring gear 46 which meshes with gear 28 and is driven thereby to rotate fan housing 36.

The gears 28, 30 and 46 rotate on fixed axes. The ratios are such as to drive the fan shaft 32 at 5,000 to 12,000 R. P. M., and the gear 46 at 2 to 10 R. P. M.

The low pressure side of fan housing 36 is provided with a radial arm 48 adapted to extend to perforations 10 in partition 8. By virtue of the rotation of fan housing 36 relative to housing 2, arm 48 is movable from one perforation to another in sequence.

To the high pressure side of fan housing 36 is attached a discharge conduit 50, the end of which is substantially on the center line through inlet opening 4. In this form of construction, the discharge end of conduit 50 is sufficiently remote from the edges of opening 4 to insure against the return of the discharged air and the dirt it car-

ries into opening 4. Inasmuch as the center of opening 4 is masked by fan housing 36, and perforations 10 are near the outer periphery of the housing, the suction or intake air will tend to flow in at or near the periphery of opening 4. Thus, the disposition of the discharge opening of conduit 50 shown in Fig. 1 tends to prevent the reentry of the dirt-laden air into the cleaner. This function is further served by the use of a fan or blower 34 which operates at a fairly high speed and serves to blow the air out of conduit 50 to a point well beyond the influence of the suction at inlet 4. It may in some cases further be found desirable to extend the discharge end of conduit 50 farther beyond the plane of inlet 4 than shown in Fig. 1.

The filter unit consisting of connector 12, bag 18 and its reinforcing frame may be modified as shown in Figs. 3 and 4. These views illustrate a connector 12' adapted to carry a plurality or cluster of bags 18'. The under, or intake, side of connector 12' is substantially the same as that of connector 12, but the discharge end of the connector 12' has several outlets 52 instead of the one of connector 12. The modification shown has five such outlets, but it will of course be understood that any number may be used.

Housing 2 may be all one piece if desired, or it may be made of two or more pieces for convenience in manufacture and assembly. Fig. 1 shows a two-piece housing, comprising a base 54 to which partition 8 is secured as by a fluid-tight weld 56, and a cover 58. Cover 58 has a flange 60 fitted on base 54 as shown.

Operation.—In use, outlet 6 is connected to the line which supplies clean air to the machine or space requiring it. Flow through outlet 6 is as indicated by arrows 62. The lowered pressure caused by the suction on outlet 6 plus atmospheric pressure at inlet 4 forces air through the inlet as indicated by arrows 64. The fresh air is thus forced through openings 10 and the filter units 18, and the dust and dirt particles are screened out. These particles are lodged in the pores of filter bags 18 and would eventually result in clogging of the pores, reducing the efficiency of the cleaner and necessitating its dismantling for "maintenance," were it not for fan 34. Fan housing 36 is in continuous rotation so that connection 48 moves slowly from one filter unit to another. The suction of fan 34 reverses the direction of air flow through the filter unit it engages, dislodging the dirt from the pores of the filter cloth and discharging the dirt-laden air through conduit 50. The direction of this reversal of air flow is indicated by arrows 66.

Although the invention has been described as an air cleaner, it will of course be understood to be adaptable to use in cleaning or straining fluids generally.

I claim:

1. A fluid strainer comprising a housing having a fluid inlet and a fluid outlet, a partition between the inlet and the outlet, a ring-like series of spaced passages through the partition, fluid filtering units covering the passages on one side of the partition, an open sided chamber defined by the partition and disposed substantially centrally thereof, a motor having a motor housing secured in the chamber coaxially with said series of spaced passages, a pump housing rotatably supported by said motor housing and within said first named housing, a fluid pump in the pump housing, a conduit connected to said pump housing at the low pressure side thereof and extending to a passage through said partition, a driving connection from the motor to the pump housing to effect relative rotation between the pump housing and the strainer housing and a second driving connection from said motor to said fluid pump to drive said pump.

2. A fluid strainer as defined in claim 1, further characterized by a second conduit extending from the high pressure side of said pump housing through and beyond the fluid inlet of the first named housing.

3. An air cleaner for supplying a stream of clean air to a suction intake, said cleaner comprising a housing having a main inlet for ambient air and a main outlet through which a stream of air may pass to the suction intake, a plurality of filter units interposed in the path of the main stream of air from said main inlet to said main outlet, said filter units having inlets and outlets similarly disposed in the main stream of air with reference to said main inlet and said main outlet of said housing, an air pump in the path of the main stream of air and having its main inlet and main outlet oppositely disposed with respect to said main inlet and said main outlet of said housing respectively, a moveable connection between the main inlet of said pump and one of said filter units to enable reversing the direction of flow through the unit, means for conducting the exhaust from the main outlet of said pump through the main stream of air oppositely to the direction of flow thereof to a point beyond the plane of the main inlet of said housing, and means to move the moveable connection from unit to unit for reversal of flow through the units in sequence.

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