May 26, 1931. A. GOODLOE 1,806,898

AUTOMATIC SELF CLEANING AUTOMOBILE FILTER

Filed May 7, 1928 2 Sheets-Sheet 1

Fig. 1.

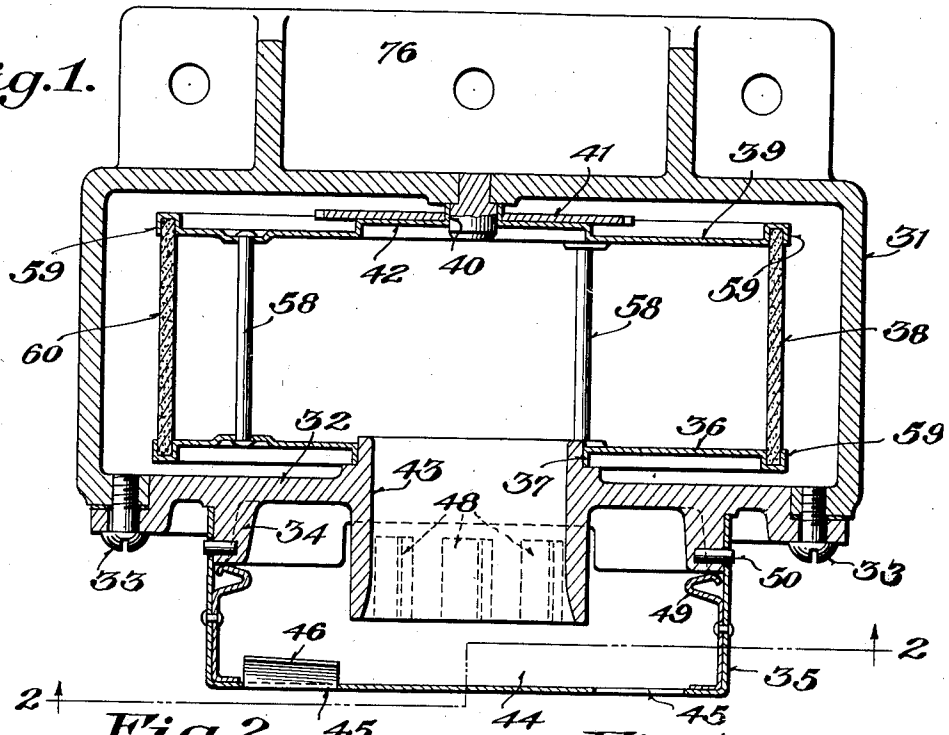


Fig. 2.

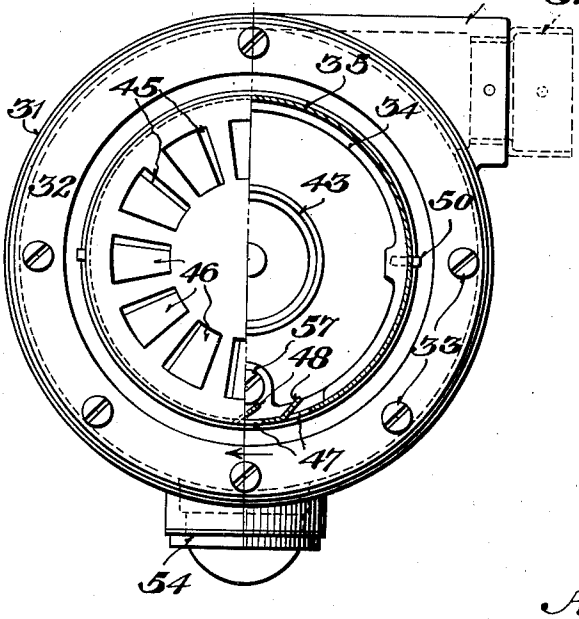
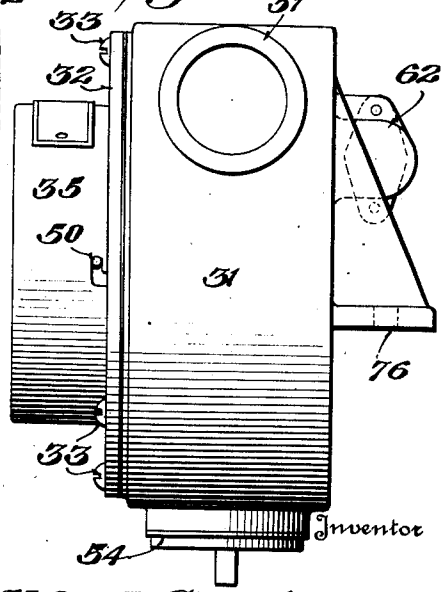


Fig. 3.



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AUTOMATIC SELF CLEANING AUTOMOBILE FILTER

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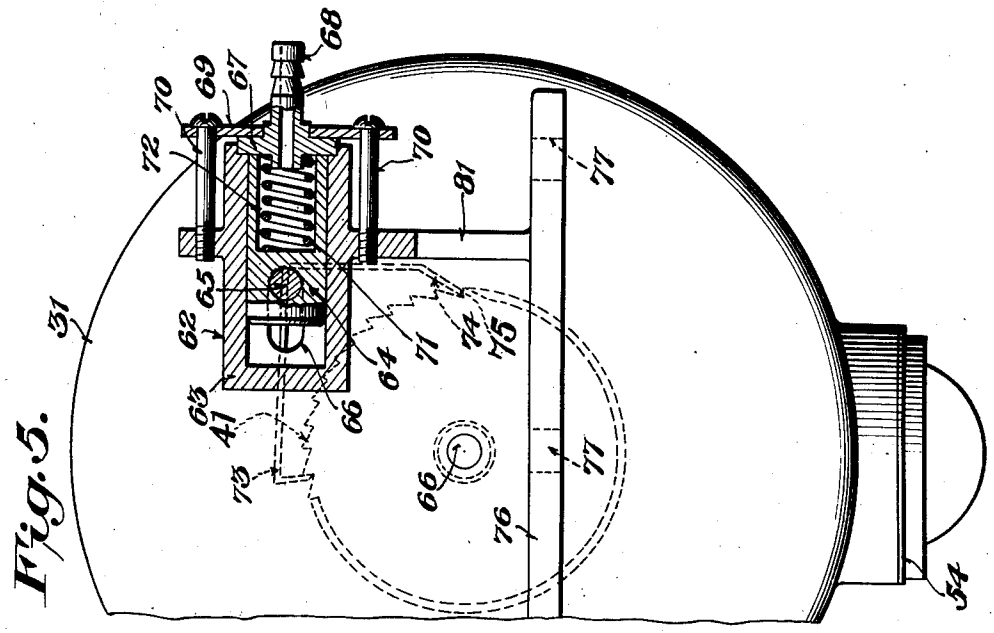


Fig. 5.

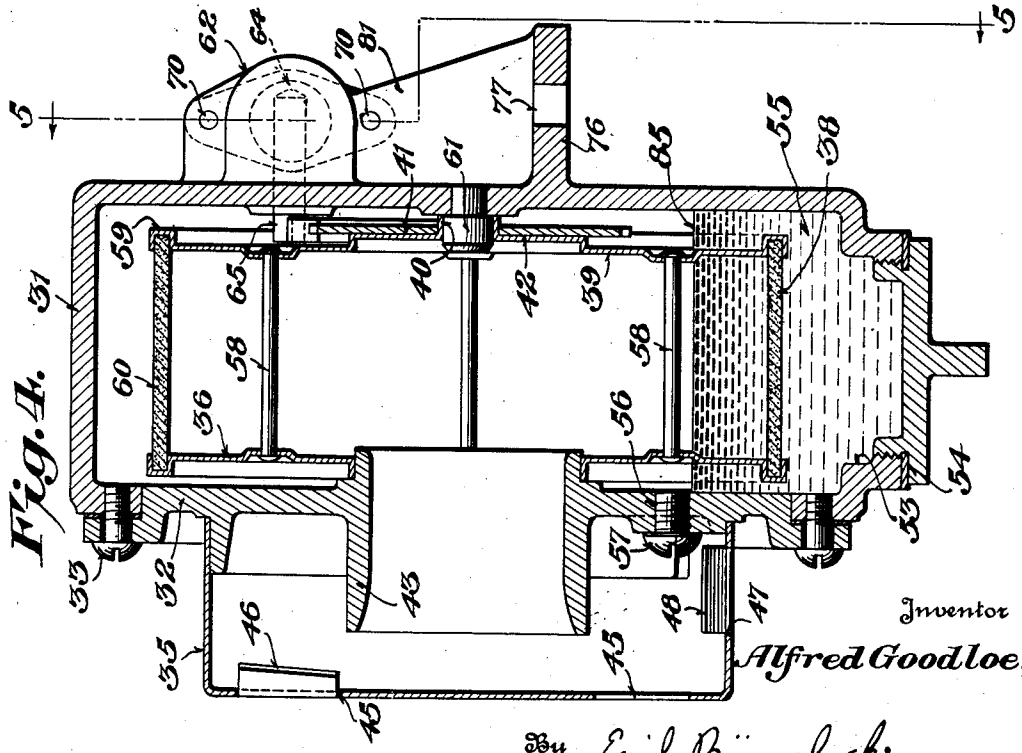


Fig. 4.

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1,806,898

UNITED STATES PATENT OFFICE

ALFRED GOODLOE, OF ROANOKE, VIRGINIA, ASSIGNOR, BY MESNE ASSIGNMENTS, TO AMERICAN AIR FILTER COMPANY, INC., A CORPORATION OF DELAWARE

AUTOMATIC SELF-CLEANING AUTOMOBILE FILTER

Application filed May 7, 1928. Serial No. 275,912.

This invention relates to an automatic self-cleaning automobile, compressor or tractor filter in which the filter is of the circular or drum type mounted to rotate. It is a known fact that most of the carbon which forms on top of the pistons and the upper part of the cylinder walls in an internal combustion engine is due to dirt and dust which is sucked with the air into the carbureter. The same condition exists in air compressors where dust deposits will clog and wear, necessitating frequent cleaning and repairs to cylinders and valves. The present invention is therefore based on the principle of cleaning the air from dirt by means of a filter which is revolved slowly in a cleaning medium when the engine is running. It is an object of this invention to provide for the rotation of the filter medium to clean the medium and to recoat it whereby the efficiency is greatly increased. It is a further object of the invention to provide a device whereby an intermittent motion is imparted to the filter unit and which is operated by the suction or pressure of the internal combustion engine or compressor. A still further object resides in the provision of a pre-cleaner provided in the path of the air to be cleaned preliminary to its passage through the filter medium. A further object resides in the specific details of construction and the assembly of the various parts.

Other objects will be apparent from the following description taken in connection with the accompanying drawings in which:

Figure 1 is a horizontal section of a filter construction,

Fig. 2 is a part front and part sectional view on line 2—2 of Fig. 1,

Fig. 3 is a side view of the filter of Figs. 1 and 2,

Fig. 4 is a vertical section of the filter of Figs. 1 to 3, and

Fig. 5 is a rear view partly in section on line 5—5 of Fig. 4.

The construction comprises a casing or housing 31 having a front cover 32 suitably secured thereto, as for instance, by screws 33. The casing and cover are preferably constructed of cast aluminum and the front cover is provided with a circular rib 34 which carries and supports the pre-cleaner casing 35.

The rotary filter drum 38 comprises a front disc 36 having an extrusion 37 in the center comprising an opening which forms an inlet for the air, a bearing for the unit, and a perfect air seal for the drum. The rear disc 39 also has an extrusion 40 of, however, smaller diameter and performs the functions of an air seal and a bearing. A ratchet wheel 41 is mounted on the extrusion 40 by means of a hole in the center and this wheel is adjacent to and is spot welded to the disc 39 at a plurality of points 42.

In the front cover 32, an air inlet opening 43 in the form of a circular extension is made integral with the cover and extends into the chamber 44. In front of this inlet opening the pre-cleaner 35 has a neutral center to prevent the dirty air from being blown directly into the filter drum. Outside of this neutral center and in the pre-cleaner casing 35 there is provided a number of openings 45 made by shearing a three-sided flap 46 and bending it inwardly at an approximately 30° angle. In view of these flaps or wings a certain whirl will be imparted to the air drawn into the pre-cleaner 35 which will have a tendency to throw the dirt particles, at any rate the larger particles, into the pocket formed by the inlet opening 43 and the bottom of the pre-cleaner. In the bottom of the pre-cleaner oblong slots 47 are sheared, preferably three in number, and the flaps 48 are bent in such a direction that they will have a tendency to catch the dirt forced outwardly by centrifugal force. The area of these outlet slots 47 is considerably smaller than the area of the intake openings 45 and thus when the engine is running the forced draft from the fan of the cooling system of the internal combustion engine in the direction of the arrow of Fig. 2 will undoubtedly create a suction under the pre-cleaner, thereby to a certain extent facilitating the removal of the accumulated dirt in the bottom of the pre-cleaner.

The pre-cleaner casing is removably secured to the rib 34 of the cover 32 by bayonet

locks 50 and two small springs 49 bearing on top of the rib 34 will forcibly secure the casing 35 and prevent the casing from unlocking itself due to vibration.

The casing 31 has an outlet extension 51 for the cleaned air to which a connection 52 is secured which forms a connection for a flexible cable to the carbureter. In the bottom of the casing 31 is an opening 53 into which a closure or plug 54 may be screw-threaded. This plug permits the oil 55 to be drained from the bottom of the casing and opening 56, closed by a screw valve 57, provides for obtaining the proper level 85 of the oil in the casing. The casing is filled with oil through the opening 43.

The filter drum 38 includes two discs 36 and 39 spaced from each other by spacing rods 58. Bent portions 59 forming grooves in the periphery of the discs hold and secure the filter medium 60 in place. This filter medium is in the form of a ring and is approximately 1/8 of an inch in thickness.

A pin 61 mounted in the rear of the casing 31 forms a bearing for the disc 39 and thus pin 61 and inlet opening 43 form the bearings for the complete filter drum. These bearings are, of course, lubricated due to the rotation of the drum and the presence of the oil.

The means for driving the filter drum is clearly shown in Figs. 4 and 5 wherein the filter operator 62 comprises a cylinder 63 cast integral with the casing 31. A piston 64 is provided in the cylinder having a pin 65 secured therein which extends into the casing 31 through a slot 66. The end of the cylinder is closed by a closure plate 67 having a nozzle 68 integral therewith. This plate is held in place by a clamp 69 secured by screws 70 in the flange 81. A rubber tube or pipe leading to the intake manifold of an internal combustion engine is connected to the nozzle 68. A spring 71 is mounted in a hollow portion 72 of the piston and bears at one end on the piston and the other end on the plate 67. The pin 65 carries the ratchet spring 73 which cooperates with the teeth of the ratchet wheel 41. A spring catch 74 is also provided, the end 75 of which bears on the ratchet teeth and prevents the filter drum from rotating backwards. The filter drum is rotated a distance corresponding to approximately 3/8 of an inch every time the engine is started. This arrangement may be reversed in case no vacuum but pressure is available or in the absence of pressure or vacuum, mechanical or electrical means, or a combination of such means, may be used for the rotation of the filter drum. Also the piston 64 can be secured to or operated by a clockworks whereby the drum may be periodically operated.

Projecting flange 76 is cast integral with casing 31 and is provided with holes 77 by means of which the device may be secured at any desired location.

Various forms of filter medium may be used in this filter but the particular form most suitable consists of a frame of foraminous material having a brush-like filtering material interwoven in or enveloping the frame consisting of a liquid absorbent base and closely arranged relatively flexible dust collecting spines fixed to said base. This material is disclosed in application Serial No. 262,174, filed March 16, 1928, Patent No. 1,757,690 issued May 6, 1930.

The operation of the filter is as follows.

When the internal combustion engine is started, air is sucked through openings 45 into and through the pre-cleaner and then through opening 43 into the drum 38 and then passes through the filter medium 60, charged with oil to increase its dust catching capacity. The air then passes through the outlet 51 to the carbureter. At the same time the suction from the engine will force the piston 64 toward the right against plate 67 and against the force of the spring 71 which is compressed. Simultaneously, the pin 65 and spring 73 attached to the piston will travel toward the right and thus move the filter unit a distance equal to approximately one notch. By equipping this device with a stronger or weaker spring, the piston 64 will, on account of the suction or pressure as the case may be, either be held in this position until the engine or compressor stops when on account of the spring 71, the piston will be pushed back to its original position, or if there are variations in the suction or the pressure, the piston will move back and forth, thus slowly revolving the filter drum. The same condition can be also obtained by using mechanical or electrical means for revolving the filter drum.

When the filter is in actual operation, the dirt that has accumulated in the filter medium will be washed out when the unit slowly revolves in the oil which to a certain extent is facilitated by the wave created in the oil when the automobile is in motion.

I claim as my invention:

1. An air filter particularly for a compressor or the air intake of the carbureter of an internal combustion engine or the like comprising a housing; a pin mounted on the housing; a filter drum rotatably mounted on the pin, said housing having a bath of oil in the bottom thereof into which the filter projects; a plurality of teeth associated with said filter drum; and a piston and cylinder device cooperating with said teeth and operated by the suction of the associated engine to intermittently rotate the drum to automatically and periodically clean and recoat the filter with oil.

2. An air filter particularly for a compressor or for the intake of the carbureter of an

internal combustion engine or the like comprising a housing; a pin mounted on the housing; a filter drum rotatably mounted on the pin, said housing having a bath of oil in the bottom thereof into which the filter projects; a plurality of teeth associated with said filter drum arranged on one side thereof; and a piston and cylinder device mounted on the housing and having a pin mounted in the piston adapted to cooperate with the teeth of the drum, said piston and cylinder device operating by the suction of the associated engine to intermittently rotate the drum to automatically and periodically clean and recoat the filter with oil.

3. An air filter particularly for a compressor of for air intake of the carbureter of an internal combustion engine or the like comprising a housing; a pin mounted on the housing; a filter drum rotatably mounted on the pin, said housing having a bath of oil in the bottom thereof into which the filter projects; a plurality of teeth associated with said filter drum arranged on one side thereof; and a spring-pressed piston and cylinder device mounted on the housing and having a pin mounted in the piston adapted to cooperate with the teeth of the drum, said piston and cylinder device operated by the suction of the associated engine to intermittently rotate the drum to automatically and periodically clean and recoat the filter with oil.

4. An air filter particularly for the air intake of the carbureter of an internal combustion engine comprising a housing; a front cover secured to the housing and having an air inlet opening therein; a filter drum rotatably mounted in said housing; a ratchet wheel secured to the filter drum, said housing having a bath of oil in the bottom thereof into which the filter projects; and a piston and cylinder device operated by the suction of the associated engine to intermittently rotate the drum by means of the ratchet wheel to automatically clean and recoat the filter with oil.

5. An air filter particularly for the air intake of the carbureter of an internal combustion engine comprising a housing; a front cover secured to the housing and having a projecting air inlet opening therein; a pin mounted in said housing; a filter drum rotatably mounted on the pin as one bearing and on the projection of the air inlet opening as the other bearing, said housing having a bath of oil in the bottom thereof into which the filter projects; a ratchet wheel secured to the filter drum; and a piston and cylinder device on the housing operated by the suction of the associated engine to intermittently rotate the drum by means of the ratchet wheel to automatically clean and recoat the filter with oil.

6. An air filter particularly for the air intake of the carburetor of an internal combustion engine comprising a housing; a front cover secured to the housing and having a projecting air inlet opening therein; a pin mounted in said housing; a filter drum rotatably mounted by means of extrusions, on the pin as one bearing and on the projection of the air inlet opening as the other bearing, said housing having a bath of oil in the bottom thereof into which the filter projects; a ratchet wheel secured to the filter drum; and a piston and cylinder device on the housing operated by the suction of the associated engine to intermittently rotate the drum by means of the ratchet wheel to automatically clean and recoat the filter with oil.

7. An air filter particularly for the air intake of the carbureter of an internal combustion engine comprising a housing; a front cover secured to the housing and having a projecting air inlet opening therein; a pin mounted in said housing; a filter drum rotatably mounted by means of extrusions, on the pin as one bearing and on the projection of the air inlet opening as the other bearing, said housing having a bath of oil in the bottom thereof into which the filter projects; a ratchet wheel mounted on one of the extrusions and secured to the filter drum; a piston and cylinder device on the housing operated by the suction of the associated engine to intermittently rotate the drum by means of the ratchet wheel to automatically clean and recoat the filter with oil; a pin mounted in said piston; and a ratchet spring mounted in said pin to contact and cooperate with said ratchet wheel.

8. An air filter particularly for the air intake of the carbureter of an internal combustion engine comprising a housing; a front cover secured to the housing and having a projecting air inlet opening therein; a pin mounted in said housing; a filter drum rotatably mounted by means of extrusions, on the pin as one bearing and on the projection of the air inlet opening as the other bearing, said housing having a bath of oil in the bottom thereof into which the filter projects; a ratchet wheel mounted on one of the extrusions and secured to the filter drum; a piston and cylinder device on the housing operated by the suction of the associated engine to intermittently rotate the drum by means of the ratchet wheel to automatically clean and recoat the filter with oil; a pin mounted in said piston; a ratchet spring mounted in said pin to contact and cooperate with said ratchet wheel; an outlet valve in the housing for the oil; and an air outlet for the cleaned air.

9. An air filter particularly for the air intake of the carbureter of an internal combustion engine comprising a housing; a front cover secured to the housing and having a projecting air inlet opening therein; a pin

mounted in said housing; a filter drum rotatably mounted, by means of extrusions, on the pin as one bearing and on the projection of the air inlet opening as the other bearing, said housing having a bath of oil in the bottom thereof into which the filter projects; a ratchet wheel mounted on one of the extrusions and secured to the filter drum; a piston and cylinder device on the housing operated by the suction of the associated engine to intermittently rotate the drum by means of the ratchet wheel to automatically clean and recoat the filter with oil; a pin mounted in said piston; a ratchet spring mounted in said pin to contact and cooperate with said ratchet wheel; an outlet valve in the housing for the oil; an air outlet for the cleared air; and a pre-cleaner casing mounted on the front cover and in front of the projecting air inlet opening to remove the larger particles of dust from the air.

10. An air filter particularly for the air intake of the carbureter of an internal combustion engine comprising a housing; a front cover secured to the housing and having a circular rib; a filter drum rotatably mounted in said housing; a pre-cleaner secured to the rib on the front cover and adapted to remove the larger particles of dust from the air; and means operated by the suction of the associated engine for rotating the filter drum.

11. An air filter particularly for the air intake of the carbureter of an internal combustion engine comprising a housing; a front cover secured to the housing and having a circular rib; a filter drum rotatably mounted in said housing, said housing having a bath of oil in the bottom thereof into which the filter projects; a pre-cleaner removably mounted on the rib of the front cover and adapted to remove the larger particles of dust from the air; and a piston and cylinder device on the housing operated by the suction of the associated engine to intermittently clean and recoat the filter with oil.

In testimony whereof I affix my signature.

ALFRED GOODLOE.