

July 8, 1930.

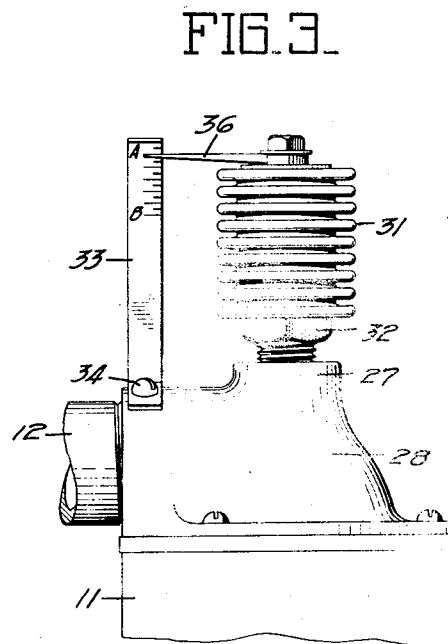
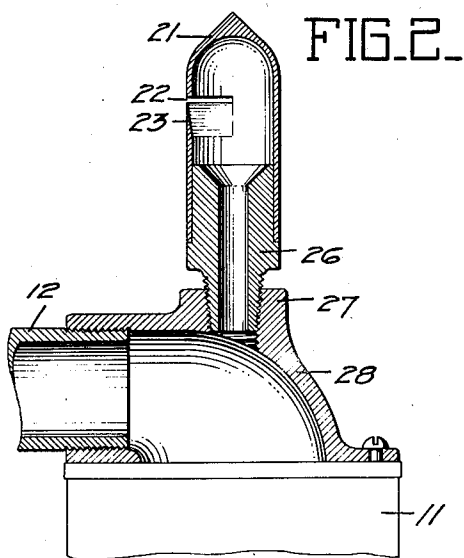
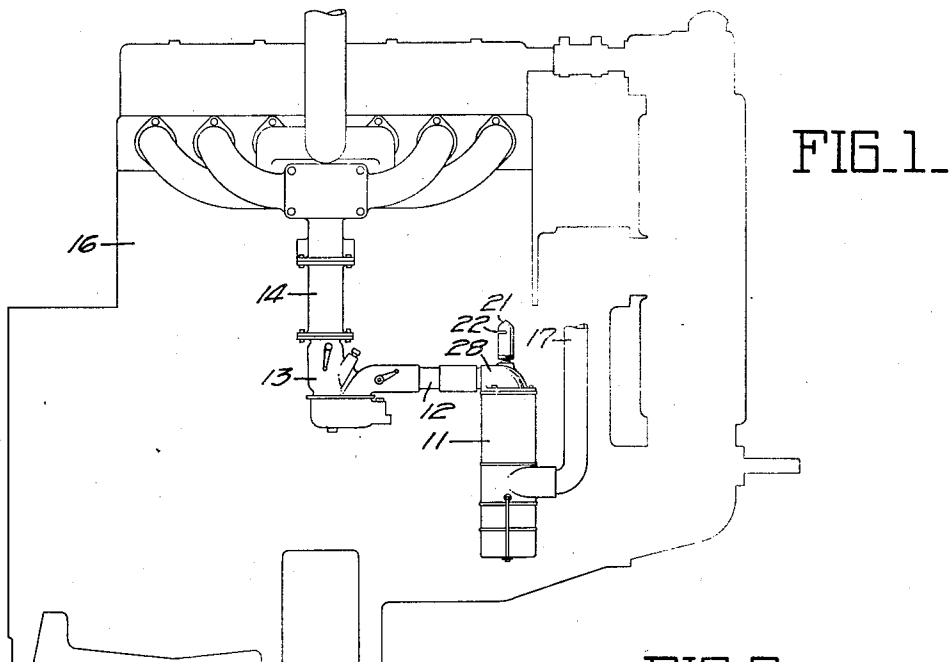
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1,770,094

SIGNAL

Filed July 1, 1929

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

FIG. 4

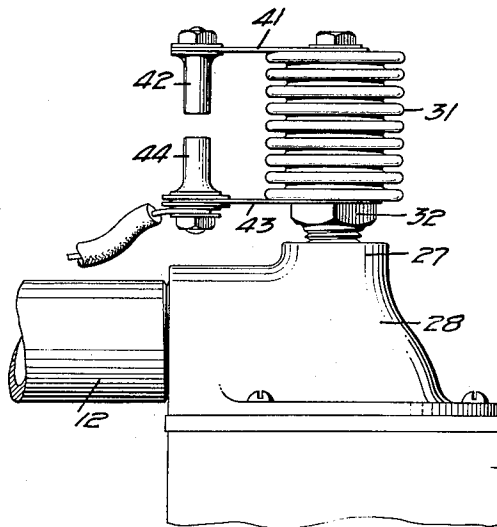


FIG. 5

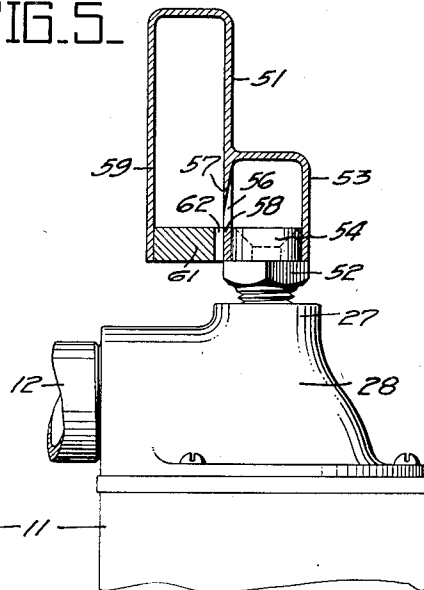


FIG. 7

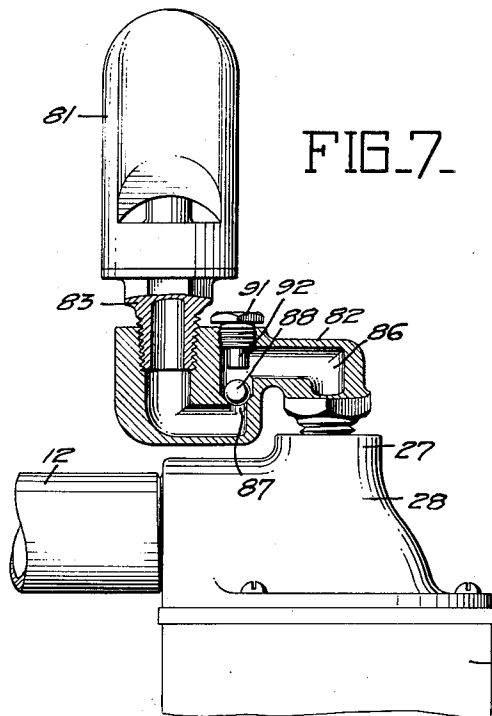
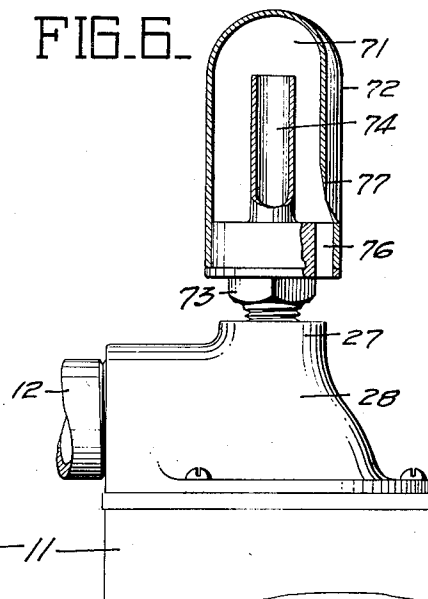


FIG. 6



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UNITED STATES PATENT OFFICE

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SIGNAL

Application filed July 1, 1929. Serial No. 375,159.

My invention relates to signals for use with cleaners, particularly air cleaners such as are utilized in connection with hydrocarbon motors.

5 Air cleaners are usually installed upon machinery wherein air is utilized as a fluid during the operation of the engine. The purpose of the cleaners, as is well known, is to remove particles of grit, dirt and other
10 undesirable foreign matter from the air prior to its admission to the engine. The pressure drop through the cleaner, which ordinarily is negligible, rises under some conditions to such a value as to affect the efficiency and
15 operation of the engine.

It is an object of my invention to provide a device for indicating the relative condition of an air cleaner.

20 Another object of my invention is to provide a device, which, upon the removal by the air cleaner of a predetermined quantity of foreign matter, enables a suitable signal to advise an operator.

25 A further object of my invention is to provide an air cleaner so that a more efficient delivery of air is effected to the engine to which it is attached.

30 The invention possesses other advantageous features, some of which with the foregoing will be set forth at length in the following description which I shall outline in full that form of the signal of my invention, which I have selected for illustration in the drawings accompanying and forming part of
35 the present specification. In said drawings I have shown one form of signal embodying my invention, but it is to be understood that I do not limit myself to such form since the invention, as set forth in the claims, may be
40 embodied in a plurality of forms.

In the drawings to which I have made reference,

45 Fig. 1 is a side elevation of a hydrocarbon motor to which a device of my invention is attached.

Fig. 2 is a section through a form of a device of my invention positioned upon the outlet of an air cleaner.

50 Fig. 3 shows a form of indicating means employed.

Fig. 4 is a modified form of indicator utilized for initiating a signal.

Fig. 5 is a modified form of indicator and signal.

Fig. 6 is another modification of the device of my invention.

Fig. 7 is a further modification.

The device and method of my invention may be briefly characterized as comprising the provision of means for indicating that
60 the pressure drop through the air cleaner has reached a predetermined amount.

While my device may be utilized in connection with air cleaners positioned upon other forms of engines it is employed with
65 great success upon an ordinary gasoline engine. Thus, as is particularly shown in Fig. 1, an air cleaner 11 is usually provided in communication with the air horn 12 of a carburetor 13. The carburetor is utilized in
70 the usual manner to supply fuel through the intake manifold 14 to the several cylinders of the hydrocarbon motor indicated generally at 16.

75 The air cleaner 11 is usually of any of the commercial types available upon the market. Under operating conditions, as when the hydrocarbon motor 16 is utilized with harvesting or tractor machinery, the air cleaner often rapidly fills with foreign matter, and it is
80 both expedient and desirable that the filter be cleaned several times during a normal day's run. However, because of the exigencies of operation it happens, not infrequently, that
85 the air cleaner is neglected and, accordingly, as the pressure drop through the cleaner rises, the efficiency of the engine drops off.

To warn against the presence of an excessive pressure drop through the air cleaner I provide means which are responsive to the
90 condition in the air cleaner to indicate to an operator, or to draw his attention to it in some manner, that the air cleaner should be given attention. As is shown in Figs. 1 and 2, such means comprises whistle 21 provided
95 upon the delivery side of the air cleaner and in fluid communication between the atmosphere and the air horn of the carburetor. The whistle is usually manufactured of suitable material as metal and is provided with an
100

aperture 22 in such a manner that only a small portion of the air taken into the intake manifold is passed thru it. The whistle is ordinarily inoperative until an excessive pressure drop through the air cleaner occasions the passage of a large volume of air thru the aperture. The whistle then sounds a characteristic note. To position the whistle it is conveniently mounted upon a hollow stud 26 which is screwed into boss 27 on cap 28 of the air cleaner.

In Figs. 3 and 4 I have illustrated another form of means for accomplishing the objects of my invention. A collapsible, resilient, metal bellows 31 is conveniently mounted upon a hollow stud 32 which is in fluid communication with the air cleaner. Upon an increase in the pressure differential between the intake manifold and the atmosphere the bellows collapses. This factor I preferably utilize to supply a suitable indication of the condition of the air cleaner. Thus in the form shown in Fig. 3 a strip 33 is usually fastened upon the air cleaner by a screw 34 in such a manner that it is operatively positioned with respect to pointer 36 mounted upon the bellows. The strip is conveniently provided with a series of graduations so laid out that when the bellows is in normal uncollapsed position the pointer is opposite to a letter A on the strip, which indicates that the air cleaner is in satisfactory condition. As the pointer 36 moves down it approaches a lower limit, indicated by the letter B, at which point it is desirable that the air cleaner be removed and reconditioned.

Under operating condition it sometimes happens that the operator will ignore the indication. The collapsible bellows 31 is expediently utilized further to actuate a suitable signal. Thus as is shown in Fig. 4 the bellows is provided with an extending arm 41 upon which is mounted, in electrical contact with the arm, contact 42. A support 43 is provided between the bellows and the stud 32 upon which the bellows is mounted. Another contact 44 is provided upon the arm 43 from which it is insulated. These contacts are placed in an electrical circuit, in any well known manner, and utilized to sound a suitable horn or bell to warn the operator that the air cleaner should be reconditioned.

I have found it desirable also, in some instances, to place the contacts mentioned above in the ignition circuit of the motor in such a manner that the circuit was rendered ineffective when the air cleaner needed reconditioning. This assures the necessary attention to the cleaner.

Because of the hazardous conditions under which gasoline engines are sometimes operated it is expedient that all possible dangers be obviated from back firing thru the carburetor of the engine. While the air cleaner imposes a closure to the air intake side of the

carburetor it is possible that a flame might be emitted thru the aperture 22 provided in such a form of a device of my invention as is shown in Fig. 2.

In Figs. 5, 6 and 7 I have shown various forms of my invention which are readily utilized to obviate the hazardous effects of backfiring. In the modifications shown in Figs. 5 a metal body 51 is provided upon the hollow stud 52 which is in communication with the air delivery side of the cleaner. A portion 53 of the body 51 is in direct communication with the air cleaner thru passage 54 in stud 52. The portion of the body 51 is usually provided with an aperture 56 formed by lips 57 and 58. Lip 57 is expediently of such a nature that upon a passage of air into the manifold a musical note will be sounded. To screen the aperture 56 a portion 59 of the body 51 substantially surrounds the aperture and provides a large volume into which fluid emitted from the aperture passes. The portion 59 is partially sealed with a plug 61 so that aperture 62 is provided for the passage of fluid into the body 51 in such a manner that the fluid stream impinges upon the lip 57. The aperture 62 is adjacent to the base of the body 51 and is of such an extent that considerable fluid resistance is imposed upon the air stream entering the aperture.

In the modification shown in Fig. 6 a whistle 71 having an outer shell 72 is mounted upon hollow stud 73 which is provided in communication with the air cleaner. In this instance, however, the fluid passage thru the stud is extended by means of a tube portion 74. An air entrance 76 is provided in the lower portion of the outer shell adjacent to a lip 77.

In the modification shown in Fig. 7 a suitable suction whistle 81 is positioned upon a hollow body 82 by a stud 83 to which the whistle is affixed. The body 82 is provided with a fluid passage which I have indicated as 86. Interposed in this fluid passage and adjacent to a restricted portion 87 thereof I preferably position a ball check 88 in such a manner that the passage of fluid out of the intake manifold to the atmosphere is resisted by the ball check. However, the weight of the check is so slight that upon the occasioning of a pressure drop beyond a certain desired minimum thru the air cleaner the check is lifted from its position and is rendered inoperative with respect to the passage of air into the manifold. To facilitate the construction and placing of the check I preferably provide a stud 91. This stud is conveniently formed with an extension 92 adapted to be positioned in the passage 87 to retain the check in position so that it cannot work its way out.

I claim:

1. In combination with an engine having an intake manifold, an air cleaner in communication with said manifold thru which air flows to said engine, and means for indicating the pressure drop of said air flowing thru cleaner.

2. In combination with an engine having an intake manifold, an air cleaner in communication with said manifold thru which air flows to said engine normally with negligible pressure drop across said cleaner, and means for indicating an abnormal pressure drop thru said cleaner.

3. In combination with an air cleaner, said cleaner being in communication with a source of air and having a passage away from said cleaner, a pressure responsive means in communication with said passage for indicating a differential between said source and said passage.

4. A signal device including an air cleaner in communication with a source of air and having a passage away from said cleaner comprising a signaling device, and means responsive to a pressure differential between said source and said passage for enabling said signaling device.

5. In combination, an air cleaner in communication with a source and a fluid consumer, means responsive to a difference in pressure between said source and said consumer, and means actuated by said responsive means for initiating a signal.

6. In combination, a body through which air is adapted to pass, indicating means for giving an indication to an operator, and means responsive to an abnormal pressure drop through said body for energizing said indicating means to indicate to the operator of the abnormal pressure drop.

7. In combination, an air cleaner, means for indicating an abnormal condition to an operator, and means responsive to an abnormal pressure drop through the cleaner for enabling the indicating means.

8. In combination, an air cleaner, a hollow body carrying a signaling means adapted to be placed in communication with the cleaner under abnormal conditions therein, and valve means responsive to an abnormal condition in the cleaner for providing communication to the signaling means.

9. In combination, an air cleaner, a signaling means enabled upon decrease of pressure therein to signal an operator, and valve means responsive to pressure decrease through the cleaner for placing the signaling means in communication with the cleaner to be enabled to signal an operator.

In testimony whereof, I have hereunto set my hand.

ELMER E. WICKERSHAM.