Aug. 19, 1952 V. L. WALLER 2,607,314

ENGINE PERFORMANCE INDICATOR

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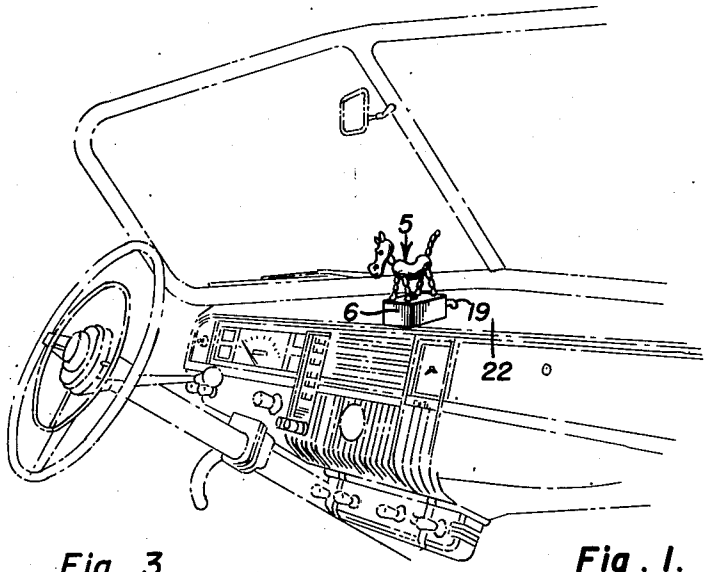


Fig. 1.

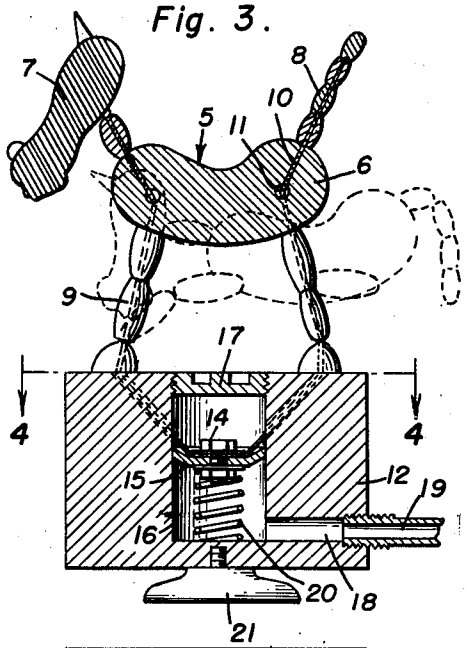


Fig. 3.

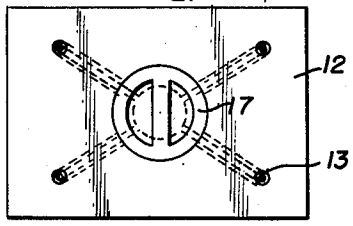


Fig. 4.

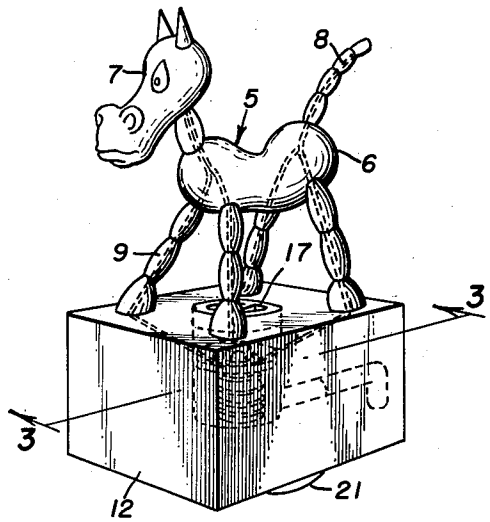


Fig. 2.

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ENGINE PERFORMANCE INDICATOR

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1 Claim. (Cl. 116—114)

1

The present invention relates to new and useful improvements in engine performance indicators for internal combustion engines of automobiles and other motor-driven vehicles to indicate the efficiency in the operation of their engines during vehicle operational periods and to combine with such indicators collapsible animal or other figures, the motions of which serve to accurately reflect and positively indicate engine performance and at the same time afford amusement to the occupants of the vehicles.

Another principal object of the invention is the provision of an engine performance indicator for an internal combustion engine employing an intake manifold and/or an automatic spark advance line, which indicator is responsive to the slightest fluctuations or variations of vacuum in such manifold or line and which is adaptable to be rapidly and readily installed in a prominent position upon its automotive vehicle to visually and continually register such fluctuations during vehicle operational periods.

A further important and essential object is to provide an engine performance indicator adaptable, during its permanent installation upon an automotive vehicle and the internal combustion engine of same, to be accurately adjusted and carefully set for approximately the maximum vacuum developed in the intake manifold and/or automatic spark advance line of said engine at idling speed, this in order to reflect the ideal operation of such engine during vehicle operational periods from the standpoint of economy and operating efficiency of the same, and also to warn the vehicle operator that engine adjustments or repairs are necessary as and when a departure from said ideal operation occurs.

A still further important and vital object is to provide an internal combustion engine vacuum responsive performance indicator, the actions and movements of which reflects engine throttle setting; engine load or condition; fuel consumption; approximately horse-power drawn from the engine; and the effect of altitude upon the latter.

It is also an object of the invention to construct the figure in a manner to assume various grotesque positions in accordance with variations in the engine performance.

A further object of the invention is to provide a device of this character of simple and practical construction, which is efficient and reliable in operation, relatively inexpensive to manufacture and which otherwise is well adapted for the purposes for which the same is intended.

2

Other objects and advantages reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming part hereof, wherein like numerals refer to like parts throughout, and in which:

Figure 1 is a perspective view of the engine performance indicator comprehended by the invention, as it would appear when operatively mounted upon the instrument panel of an automotive vehicle;

Figure 2 is an enlarged perspective view of the indicator with the indicating device or figure of same shown in a vacuum activated and tensioned position;

Figure 3 is a vertical sectional view taken on the line 3—3 of Figure 2 with the indicating device or figure shown activated in full lines and deactivated in dotted lines; and

Figure 4 is a horizontal section of the indicator taken on the line 4—4 of Fig. 3.

Before taking up the more detailed description of the present invention, it should be here stated, that hitherto, when the efficiency and/or performance of an automotive vehicle internal combustion engine of the type employing spark ignition was to be ascertained and determined, it has been customary and necessary to employ dial gauges and other instrumentalities and the services of skilled automotive mechanics to secure reasonably accurate and true findings of such efficiency and/or performance. Hence, it is the peculiar intent and particular purpose of this invention to dispense with the need of the aforementioned dial gauges and other instrumentalities together with the services of said skilled mechanics and in lieu thereof and as substitute therefor to provide a simplified and efficient engine performance indicator having permanent connection and communication with the engine intake manifold and/or automatic spark advance line, and which when operatively installed or mounted upon an automotive vehicle requires no especial skill or qualification on the part of the vehicle operator to interpret the engine conditions reflected thereby.

As stated above, the present engine performance indicator has permanent connection and communication with the engine intake manifold and/or automatic spark advance line, this in order that the slightest change or variation in sub-atmospheric pressure or degree of vacuum in the engine intake manifold or spark advance line will be instantly and positively registered by the indicator, and when it is borne in mind that

the subatmospheric pressures or degrees of vacuum in the engine intake manifold or spark advance line reflects, at all times during engine and vehicle operational periods, the accurate and true efficiency and performance of the engine and the conditions existing therein, and when such pressures or degrees are translated into movements by the indicating device of the indicator, any unskilled person can easily and readily understand the meaning and/or interpret the significance of each and every movement of said device under various driving conditions.

Accordingly, the present invention essentially resides and is more particularly concerned in the provision of an internal combustion engine performance indicator, which in its preferred embodiment is characterized by the employment of vacuum responsive means having permanent connection and communication with the intake manifold or automatic spark advance line of its associated engine and an articulated collapsible figure or other indicating device flexibly connected to and co-operating with said vacuum responsive means, whereby reactions of the latter to varying degrees of vacuum created or occurring in said manifold or advance line causes said figure or device to assume various positions, each of which denotes and reflects a specific degree of vacuum and in consequence thereof informs the vehicle operator whether the engine is operating efficiently or inefficiently.

Referring now to the drawing in detail wherein, for the purpose of illustration, I have disclosed one embodiment of the invention, the numeral 5 designates a jointed animal figure generally which includes a body 6, head 7, tail 8 and legs 9. Cords 10 or other flexible members extend freely through openings 11 in the body and through the sections of the head, tail and legs to loosely connect the same to the body.

The figure 5 is supported on a base 12 having openings 13 therein for receiving the lower ends of the cords 10 for attaching the cords to a piston or plunger 14 which includes a flexible washer 15 working in a cylinder 16 in the base.

The upper end of the cylinder 16 is closed by a threaded plug 17 and a passage 18 communicates with the lower portion of the cylinder beneath the piston, the passage having a suction line 19 attached thereto and which leads to the intake manifold or automatic spark advance line of an internal combustion engine (not shown). A helical coil spring 20 is positioned in the cylinder 16 under the piston to raise the piston when suction is released or decreased.

A conventional type of rubber suction cup 21 is suitably secured to the bottom of the base 12 and by means of which the base and animal figure supported thereon may be mounted on a suitable supporting structure, such as the instrument panel 22 of an automobile or other motor-driven vehicle.

In the operation of the device, the spring 20 will move the piston 14 upwardly in the cylinder 16 when the engine, to which the suction line 19 is attached, is not running, whereby the cords 10 will be slacked and permit the sections of the head 7, tail 8 and legs 9 to collapse, as shown by the dotted lines in Figure 3 of the drawing.

When the engine is started, the suction in the intake manifold pulls the piston 14 downwardly in the cylinder and causes the cords to be pulled taut, to thus straighten the sections of the head, tail and legs and to hold such parts in an upright position as shown by the full lines in Figure 3.

Accordingly, variations in the operation of the engine, such as the constant changing in the power output of the engine due to traffic conditions or the travel of the automobile up and down grades, the suction or vacuum developed by the engine will vary, thus causing the figure to perform various amusing motions and to assume various grotesque positions. Likewise, the figure will serve as an indicator of the engine performance by its movements and actions when the engine is not running smoothly or efficiently due to various causes, and thus warn the driver of the need for adjustment or repairs.

The present engine performance indicator when employed with and installed upon an automotive vehicle internal combustion engine functions, as hereinbefore stated, to reflect engine condition; fuel consumption; horse-power or engine load; and effect of altitude on the engine, each of which for sake of clarity will now be individually described.

Under the heading of engine condition: the indicator can and does reflect maladjustment of the spark, carburetor, or timer, and/or defective parts of the same; also reflects worn piston rings; burned, warped or sticky valves; leaky engine head and/or carburetor gaskets; incorrect or improper valve clearances; clogged muffler; improper fuel mixtures, and so on and so forth. Stated otherwise, for a readier understanding of the functioning of the indicator in reflecting engine conditions: When the articulated figure 5 or equivalent indicating device is straight and steady during engine operational periods the same is indicative of proper engine operation. When the articulated figure shivers during engine idling speeds, but is steady at engine working speeds, such shivering ordinarily denotes loose valve stem guides, except in the case of four cylinder engines such shivering or vibration is normal. When the head and/or tail of the articulated figure weaves, such action or motion usually indicates either faulty ignition timing, breaker points or distributor out of synchronism, spark plug gaps set two close, or too rich gas mixture. When the articulated figure is straight and steady at engine idling speeds but shakes or vibrates at engine racing speeds, such shaking or vibrating normally denotes weak valve springs. When the articulated figure droops and falters occasionally this ordinarily indicates lean or poor gas mixture. When the articulated figure remains straight but jerks occasionally, such jerking is usually due to sticky valves. When the articulated figure drops regularly, such action ordinarily is indicative of either burned, chipped, or warped valves and/or seats; or insufficient tappet clearance. When heavy regular drops of the articulated figure occurs, such drops are usually due to either leaky head gasket and/or compression leak between the pistons and their correlated cylinders. When the articulated figure is straight or droopy at engine idling speeds, or is slow in straightening-up after the throttle pedal has been repeatedly depressed or pumped, such actions are usually due to a choked muffler. And in conclusion, a continuous droopy state of the articulated figure may indicate any of the following conditions: vacuum leaks in the indicator base or connecting lines of same; poor compression due to scored cylinder walls or pistons and/or worn piston rings; ignition out of time; faulty valve timing; leaky carburetor or intake manifold gaskets; burned out heat riser; and excessive altitudes, as hereinafter more fully set forth.

Under the heading of fuel consumption: the present indicator reflects excessive fuel consumption and poor driving habits of automotive vehicle operators, by the weaving of the head and/or tail of the articulated figure when the fuel mixture is unduly and unnecessarily rich, or by the drooping or faltering of such figure when the fuel mixture is too lean or poor.

Under the heading of horse-power or engine load: the present indicator during operational periods of the engine reflects the horse-power developed by the same under various driving conditions, as for example, when the maximum engine horse-power is developed the articulated figure **5** is completely collapsed for the reason that the engine throttle opening varies with the horse-power developed by the engine.

Under the heading of altitude and its effect upon the engine: the articulated figure 5 at relatively high altitudes is normally in a semi-collapsed state due primarily to the low or reduced atmospheric pressures at such altitudes, which low pressures conjointly with the consequent abnormal lower vacuum in the engine intake manifold or automatic spark advance line cause the normal semi-collapse of the articulated figure. In this connection, it should be borne in mind, that with every thousand feet rise in altitude the vacuum in the engine intake manifold or spark advance line decreases approximately one inch.

In the accompanying drawings and in the foregoing description I have shown and described the present engine performance indicator as operatively mounted upon the instrument board **22** of the automotive vehicle, in which location such indicator is in full view and driving vision of the operator of said vehicle. However, I desire to have it understood that I do not wish to be specifically confined to such location, inasmuch as, in certain instances and installations the indicator has been utilized as a hood ornament and accordingly in these circumstances is centrally located on the forward portion of the vehicle hood. Again, in other installations the present indicator has been utilized as an ornament for the rear end of the vehicle, in which event it is operatively mounted at any desirable or suitable location on said rear end.

When the herein described engine performance indicator is employed upon automotive vehicles having vacuum operated windshield wipers, said indicator is teed into the vacuum line connecting the engine intake manifold or automatic spark advance line and the windshield wiper of the specific automotive vehicle. However, when the present indicator is employed on automotive vehicles having booster or vacuum pumps and/or electric windshield wipers, said indicator in the first instance is connected to the engine intake manifold or to the manifold side of the booster or vacuum pump of the vehicle so equipped, while, in the second instance the indicator is connected directly to the engine intake manifold. In either of these instances the indicator may be selectively connected to any of the various plugs or fittings carried by the engine intake manifold.

In the instant disclosure, I have elected to show and describe an articulated or jointed figure, such as the simulation of a horse, as the visual and continual indicating device **5** of the indicator, however, I desire to have it understood, that such showing is merely by way of illustration, inasmuch as, various other devices or apparatus may be employed for such purpose.

Manifestly, therefore, the engine performance indicator of the present invention is extremely compact and durable in construction; is thoroughly practical and serviceable in use; will not readily get out of order; and requires no special or particular skill on the part of the vehicle operator to interpret the gyrations of the same.

In view of the foregoing description taken in conjunction with the accompanying drawings, it is believed that a clear understanding of the device will be quite apparent to those skilled in this art. A more detailed description is accordingly deemed unnecessary.

It is to be understood, however, that even though there is herein shown and described a preferred embodiment of the invention, the same is susceptible to certain changes fully comprehended by the spirit of the invention as herein described and within the scope of the appended claims.

What I claim as new is:

In combination with the vacuum producing means of an internal combustion engine, of an engine performance indicator comprising a support member having a chamber therein permanently connected to and freely communicating with said vacuum producing means; a vacuum responsive member operatively disposed within said chamber; a collapsible simulation of an animal flexibly connected to said responsive member for activation thereby during engine operational periods for visually and continually indicating vacuum fluctuations occurring within said vacuum producing means; and spring means for biasing said vacuum responsive member towards its inactive position upon cessation of vacuum action to thereby effect collapse of said animal simulation.

VERN L. WALLER.

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