July 29, 1969 N. A. JUKES 3,457,905

IGNITION DISTRIBUTORS

Filed July 27, 1967

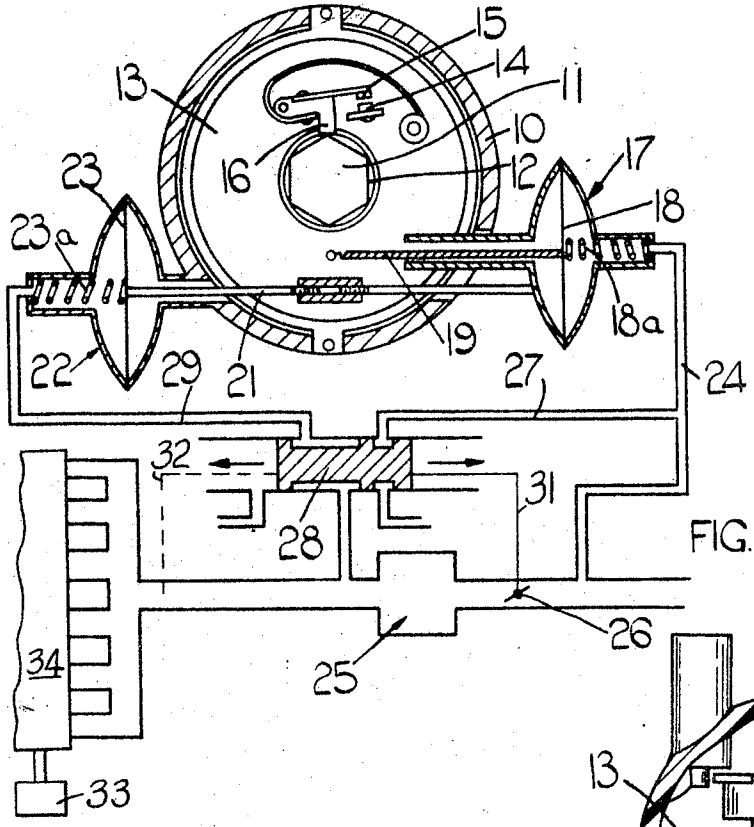

FIG. 1.

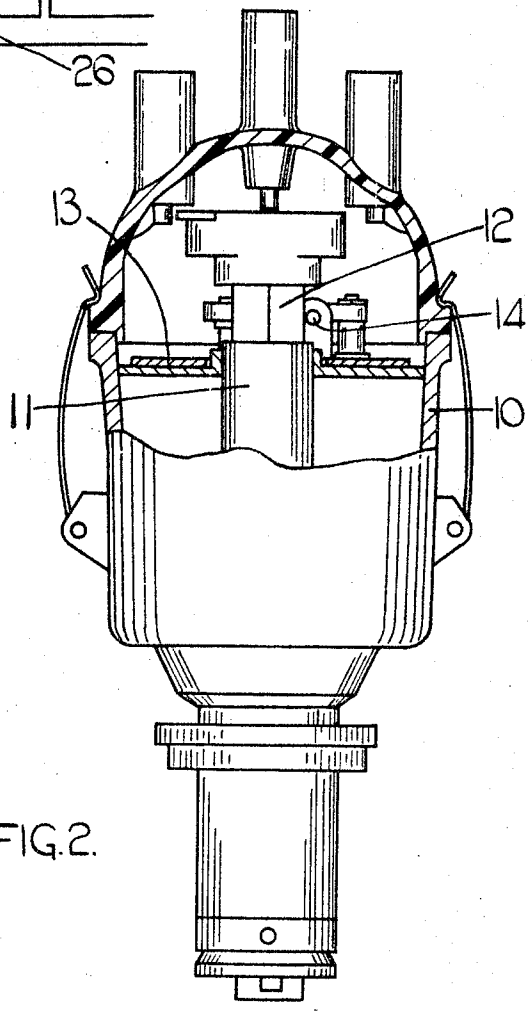

FIG. 2.

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IGNITION DISTRIBUTORS

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ABSTRACT OF THE DISCLOSURE

In an ignition distributor for use in a road vehicle, a first vacuum unit slidably mounted on the casing of the ignition distributor and operable during normal running of the engine to control advance of the ignition timing of the engine, and a second vacuum unit secured to the casing of the distributor and operable during overrun or idling conditions of the engine to move the first vacuum unit relative to the casing in a direction to retard the ignition timing of the engine.

This invention relates to ignition distributors for road vehicles, of the kind comprising a casing, a rotatable shaft extending within the casing and carrying the distributor arm and a contact breaker assembly supported within the casing for angular movement relative to said shaft, and including a fixed contact and a movable contact, said movable contact being movable into and out of engagement with said fixed contact in response to rotation of said shaft.

According to the invention a distributor of the kind specified includes a first vacuum unit slidably supported on the casing, a second vacuum unit secured to the casing, means interconnecting the first and second vacuum units so that operation of the second vacuum unit causes sliding movement of the first vacuum unit relative to the casing, further means interconnecting the first vacuum unit and the contact breaker assembly so that operation of the first vacuum unit while the second vacuum unit is at rest moves the assembly angularly from a zero position, which it occupies when both the first and the second vacuum units are at rest, in a direction to advance the ignition timing of the distributor and operation of the second vacuum unit while the first vacuum unit is at rest moves the contact breaker assembly, through the first vacuum unit and said further means, angularly from said zero position in a direction to retard the ignition timing of the distributor.

The invention further resides in an ignition timing system utilizing ignition distributor as specfied in the preceding paragraph.

One example of the invention is illustrated in the accompanying drawings wherein:

FIGURE 1 is a partly diagrammatic representation of a distributor and its associated ignition timing system, and

FIGURE 2 is a sectional view of the distributor shown in FIGURE 1.

Referring to the drawings, the distributor includes a casing **10** having rotatable therein an axially extending shaft **11** the periphery of which is shaped to define a cam surface **12**. Surrounding the shaft **11** and supported for angular movement relative thereto is an annular plate **13**. The plate **13** carries the fixed and movable contacts **14, 15** of the distributor, the movable contact **15** having a cam follower **16** associated therewith. The cam follower **16** engages the cam surface **12**, rotation of the shaft **11** serving to open and close the contacts **14, 15** and angular

movement of the plate **13** serving to adjust the timing of the distributor in known manner.

A first vacuum unit **17** is mounted on the casing for sliding movement and the diaphragm **18** of unit **17** is connected to the plate **13** by a link **19**, conveniently in the form of a tension spring.

A push rod **21** is slidably received in the casing **10** and extends between the body of the unit **17** and the diaphragm **23** of a second vacuum unit **22**, the unit **22** being secured to the casing **10** and the arrangement being such that movement of the diaphragm **23** is transmitted to the unit **17** through the rod **21**.

The unit **17** is connected by way of a conduit **24** to the air inlet side of a carburetor **25** near to the throttle butterfly valve **26** thereof and by way of a conduit **27** to a two position spool valve **28**, the unit **22** being connected by way of a further conduit **29** to the valve **28**.

The valve **28** serves in the first position of the spool to close the conduit **27** and to connect the conduit **29** to atmosphere, and in the second position of the spool to connect the conduit **27** to atmosphere and to connect the conduit **29** to the engine manifold side of the carburetor.

During normal running of the engine the throttle butterfly valve **26** is open and the valve **28** is in its first position. Thus the unit **22** is in its rest position, both sides of the diaphragm **23** being subjected to atmospheric pressure and the rod **21** and consequently the unit **17** being in their extreme right hand positions as seen in the drawings. The unit **17**, is however, subject to the depression at the air inlet side of the carburetor and changes in this depression serve to move the plate **13**, through the intermediary of the diaphragm **18** and the link **19**, from the zero position it occupies when both the units **17** and **22** are in their rest position, in a direction to advance the timing of the engine, return movement of the plate **13** towards its zero position being accomplished by a spring **18***a* acting on the diaphragm **18**.

When the throttle butterfly valve **26** is closed, the spool of the valve **28** is moved to its second position, and owing to the closure of the valve **26** a high depression exists at the engine manifold side of the carburetor. The unit **17** returns to its rest position, since both sides of the diaphragm **18** are now open to atmosphere and the plate **13** is returned to its zero position. However, the unit **22** is subjected to the high depression at the engine manifold side of the carburetor **25** and the unit **17** is moved to the left by movement of the diaphragm **23**. This movement serves through the link **19** to move the plate **13** from its zero position in a direction of retard to timing of the engine. Return movement of the plate **13** from its retarded position to its zero position is effected by a spring **23***a* acting on the diaphragm **23**.

The spool of the valve **28** is moved either through a mechanical linkage **31** associated with the accelerator pedal of the vehicle or by a pneumatic linkage **32** (shown in dotted lines in FIGURE 1) responsive to the engine manifold depression.

The ignition system previously described is used in a vehicle having exhaust emission control. It is known that when internal combustion engines are run with their throttle valves closed, for example when idling or during overrun, incomplete combustion of the fuel entering the engine takes place and there is conseqently a high percentage of noxious, unburnt, hydro-carbons in the exhaust products of the engine. In order to minimise the amount of unburnt hydro-carbons in the exhaust products it has been proposed to provide means **33** for allowing extra air to enter the engine **34** during closed throttle conditions to ensure complete combustion of the fuel. However, this more efficient combustion of the fuel leads to an increase in engine speed which is undesirable both during idling and overrun conditions. The use of the sys-

tem described ensures that during closed throttle conditions the increase in engine speed due to the more efficient combustion is negated by retarding the ignition of the engine.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:

1. An ignition distributor, for a road vehicle, including a casing, a shaft mounted for rotation in the casing, a distributor arm carried by said shaft, a contact breaker assembly operable in response to rotation of said shaft and mounted within the casing for angular movement relative to said shaft, angular movement of the contact breaker assembly relative to said shaft varying the ignition timing of the distributor, a first vacuum unit secured to said casing, a second vacuum unit mounted for sliding movement on the casing, first connecting means operatively connecting said second vacuum unit to said contact breaker assembly, whereby operation of the second vacuum unit, while the second vacuum unit is stationary relative to said casing, moves the contact breaker assembly in a first direction, second connecting means operatively connecting the first vacuum unit to the second vacuum unit whereby operation of the first vacuum unit while the second vacuum unit is inoperative moves the contact breaker assembly, through the second vacuum unit and the first connecting means in a direction opposite to said first direction, said contact breaker assembly having a zero position which it occupies when both the first and the second vacuum units are inoperative, and movement of said contact breaker assembly in said first direction from said zero position serving to advance the ignition timing of the distributor while movement of said contact breaker assembly in said opposite direction from said zero position retards the ignition timing of the distributor.

2. An ignition distributor as claimed in claim 1 in combination with an inlet manifold, an associated throttle valve, and a valve means to form an ignition timing system, the valve means movable from a first position which it occupies during normal running of the engine of the vehicle, and in which it serves to connect the first vacuum unit to the inlet manifold of the engine, and to connect the second vacuum unit to atmosphere so that variations in the manifold depression during normal running serve through the first vacuum unit to advance the ignition timing of the distributor from said zero position, to a second position which it occupies when the engine is running with its throttle valve closed and in which the valve means serves to connect the first vacuum unit to atmosphere and to connect the second vacuum unit to the inlet manifold, so that the high depression which occurs in the manifold when the engine is running with its throttle valve closed is utilized to retard the ignition timing of the distributor from said zero position.

3. A combination as claimed in claim 2 wherein said valve means is operatively connected to the throttle valve of the engine so that as the throttle valve is moved from an open position to a closed position said valve means is moved from its first position to its second position, and as the throttle valve is moved from a closed position to an open position said valve means is moved from its second position to its first position.

4. A combination as claimed in claim 2 wherein said valve means is operatively connected to the inlet manifold of the engine so that when the depression in the manifold rises above a predetermined value said valve means is moved from its first to its second position and when the depression in the manifold falls below a predetermined value said valve means is moved from its second to its first position.

5. A combination as claimed in claim 2 further in combination with an internal combustion engine having means for allowing extra air to enter the engine during closed throttle conditions, to ensure substantially complete combustion of the fuel entering the engine.

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U.S. Cl. X.R.

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