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(71) Applicant: Barnes, John Eastman
D7 Habitat Pak Sha Wan Hebe Haven
Sai Kung New Territories(HK)

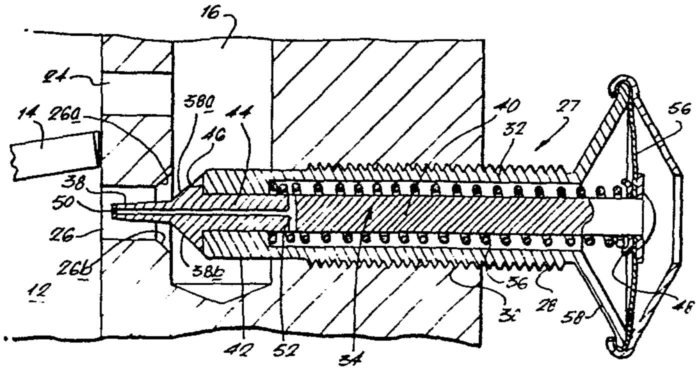
(72) Inventor: Barnes, John Eastman
D7 Habitat Pak Sha Wan Hebe Haven
Sai Kung New Territories(HK)

(74) Representative: Allen, Oliver John Richard et al,
Norman House, 105-109 Strand
London, WC2R OAE(GB)

(54) Idle mixture adjusting device with fuel cut-off during deceleration.

(57) To save fuel during engine deceleration, it has been proposed that the supply of fuel should be cut off. Such proposals have involved substantial redesign of the carburettor. The carburettor described comprises a throttle valve (14), an idling port (26) through which a fuel/air mixture is supplied on the downstream side of the valve (14) when the latter is in a closed position, a channel (16) leading to the idling port and along which the fuel/air mixture is drawn, a longitudinally adjustable idle mixture adjusting device (27) having a tapered tip (38) projecting into the channel (16) and manually movable to move the tip (38) towards and away from the port (26) to set the idling mixture of the engine, and means operable through the idle mixture adjusting device (27) for preventing the supply of fuel through the idling port during engine deceleration. The supply of fuel can be prevented by blocking the idling port (26) and or by venting the region adjacent that port (26). Such a device (27) is simple to install and does not require significant redesign of a carburettor.

FIG. 2



EP 0 079 763 A1

Croydon Printing Company Ltd

INTERNAL COMBUSTION ENGINES

This invention relates to internal combustion engines which are provided with their fuel/air mixture by a carburettor, and in particular to an improved carburettor therefor.

There are very stringent regulations governing the exhaust emission of internal combustion engines of vehicles and many arrangements have been adopted with a view to meeting these regulations. One particular area where emission from the exhaust has to be controlled is during deceleration; for example, when a vehicle is running downhill using its engine as a brake, the engine continues to run at a relatively high speed even though the throttle is closed but a small amount of fuel is drawn through the idle jet. Although this amount of fuel is small, the resulting mixture of fuel and air will be relatively rich in view of the lack of air supply. Undesirable and possibly illegal emissions can then occur from the exhaust system because of incomplete or incorrect combustion and there is also the risk of an over-rich surge when the throttle is opened.

To avoid this problem, internal combustion engine manufacturers have usually made arrangements to supply extra air during these conditions so as to prevent the mixture from becoming overly rich. This can be achieved, for example, by slightly opening the throttle butterfly valve during periods of engine braking or by providing an air bypass which is opened under the control of a valve so as to allow extra air into the engine manifold to prevent an over-rich mixture. In either case, the result is a reduction in the braking ability of the engine because of the extra quantity of air passing to the engine.

There have also been proposals to cut off the fuel supply during deceleration but all such proposals have involved a substantial redesign or change of the carburettor. This may be possible for fitting to a new vehicle but is undesirable or impossible for an existing vehicle.

It is therefore an object of this invention to provide a simple way of dealing with this situation.

According to the invention there is provided a carburettor for an internal combustion engine comprising a throttle valve, an idling port through which a fuel/air mixture is supplied on the downstream side of the valve when the latter is in a closed position, a channel leading to the idling port and along which the fuel/air mixture is drawn, a longitudinally adjustable idle mixture adjusting device having a tapered tip projecting into the channel and manually movable to move the tip towards and away from the port to set the idling mixture of the engine, and means operable through the idle mixture adjusting device for preventing the supply of fuel through the idling port during engine deceleration, i.e. when the throttle valve is closed and the engine is still turning over at a rate above idling, or in other words, during periods when the "vacuum" downstream of the throttle valve exceeds a certain figure.

By adopting the invention, it will be seen that in contrast with prior solutions which add more air to prevent the fuel/air mixture from becoming overly rich, the present invention aims to eliminate fuel in the mixture passing to the combustion chambers of an engine during deceleration of an engine or engine braking. Therefore use of the invention can avoid potential pollution problems under deceleration conditions and also gives the added advantage of reducing fuel consumption; this can represent a significant saving in hilly regions or in heavy traffic. Also by adopting the invention, better engine braking can be achieved since less air is admitted to the engine and also less fuel is being burnt during deceleration conditions.

The device replaces the idle mixture adjustment screw. Thus a conventional idle mixture adjustment screw can be removed and replaced with a device which can then act both to cut off the supply of fuel during deceleration and as the conventional idle mixture adjustment screw during normal operation of the engine. This has the advantage that a carburettor does not need any modification apart from this change and in addition there is the advantage that existing carburettors in internal combustion engines can be modified according to the invention in a relatively simple fashion. The replacement of the idle mixture adjusting screw is a simple change which can be effected by a moderately skilled car user.

The term "vacuum" is used herein on occasion and this term should be construed in the sense used in the automotive engineering field. Thus "vacuum" is not to be understood as meaning a straight scientific vacuum or zero pressure but instead a pressure reduced below atmospheric pressure which exists in the manifold. In practice "vacuum" is usually referred to in inches or centimetres of mercury and again a reference to a certain number of inches of mercury does not mean an absolute pressure above zero pressure but instead a pressure reduction by that much below the existing atmospheric pressure. References herein to vacuum are therefore to be construed in this sense.

According to one embodiment of the invention the fuel is prevented from passing through the idling port by directly sensing the pressure in the manifold and, when a sufficiently reduced pressure is noted, the fuel supply is prevented. The idle mixture adjusting device can have a port running from or near its tip to a pressure sensing device or a separate conduit from a tap on the manifold can be provided to the pressure sensing device.

Many modern vehicles have dual diaphragm distributors with which to retard the spark under idling conditions. This is done to achieve more complete combustion. In addition the butterfly valve is kept slightly open when idling. The result is that manifold pressure under idling is often higher than normal, e.g. 12 inches (30.5 cm) of mercury but as the throttle is opened slightly, the manifold pressure actually reduces to 18 to 20 inches (46 to 51 cm) of mercury whilst during engine braking and deceleration the manifold pressure is often not as low as with engines without these combustion control techniques. If purely pneumatic sensing is used to actuate the device of the invention under these circumstances, hunting may occur because it is not always easy to distinguish on the basis of manifold pressure engine deceleration and engine running with the throttle slightly open and the engine under light load. As a result in these cases it is important to sense the deceleration condition of the engine in a manner indirectly related to the manifold pressure, i.e. throttle closed and fast engine speed.

Therefore, at least in such a situation, means are provided to sense engine speed electrically or electronically using for example a centrifugal speed switch or by measuring the rate of ignition pulses and the throttle position, i.e. closed or not closed, and those means are arranged to activate the means for preventing the fuel flow during engine braking or deceleration corresponding to periods when the "vacuum" downstream of the throttle valve exceeds or should exceed a certain figure. The use of this technique is not, however, limited to such situations since the sensing of engine speed electrically is a simple technique which can avoid the use of moving parts as required in, say, a pressure-operated switch.

According to one embodiment of the invention the fuel is prevented from passing through the idling port by physically blocking that port. This can be achieved by moving the tip of the device towards the said idling port to close it during periods of engine deceleration, e.g. moving the tip by means of an electrically-operated solenoid or by means of a differential pressure sensing device.

According to one such embodiment the idle mixture adjusting device comprises operating means forming part of the idle mixture adjusting device for moving the tip towards the said idling port to close it during periods when the "vacuum" downstream of the throttle valve exceeds a certain figure, and a port runs from or near the tip of the idle mixture adjusting device through the body of the device to responsive means for sensing the pressure at the tip, the said operating means being responsive to move the said tip according to the pressure sensed through the said port.

In this embodiment the device can comprise a sleeve having on its outer surface a screw thread to enable it to be threaded into the bore of the idle mixture adjustment screw in the carburettor, a central plunger slidably mounted within the sleeve, the plunger having a nose or tip which is arranged to close the idling port when the plunger moves to its closed position, a diaphragm attached to the rear of the plunger and exposed to the pressure existing between the plunger and sleeve on its inner side, and a bore from the nose or tip of the plunger through the body of the plunger and into communication with the region between the plunger and sleeve and therefore the inner side of the diaphragm. The other side of the diaphragm can be subject to atmospheric pressure, a spring being provided around the plunger to urge it away from the closed position or the other side of the diaphragm can be subject to a constant reduced pressure.

In an alternative embodiment, the bore through the plunger can be in communication with one side of a diaphragm. For example, the other side of the diaphragm can be subject to atmospheric pressure, and the plunger is then movable towards the closed position against the action of a spring. The other side of the diaphragm could alternatively be subject to a constant reduced pressure. This pressure can be calibrated to ensure movement of the plunger at a precise "vacuum" in the manifold and this arrangement can be made more sensitive and precise than the use of a spring and atmospheric pressure.

In these embodiments during periods of high suction in the engine manifold corresponding to engine braking or deceleration, the region adjacent the said one side of the diaphragm is reduced by being in communication with the high suction through the bore from the tip of the plunger and the plunger is moved to the closed position by the diaphragm, the plunger being returned to the open position when the pressure in the engine manifold and so the pressure in the region adjacent the said one side of the diaphragm thereafter increases once engine deceleration or braking finishes.

There are, however, other ways according to the invention in which the plunger can be operated. Thus, for example, the plunger could be movable under the effect of a solenoid between the open and closed positions and the high suction existing in the manifold during engine braking or deceleration can be detected by means of a pressure sensitive electrical switch which then controls the actuation of the solenoid to move the plunger to its closed position or alternatively the solenoid could be actuated according to the RPM of the engine and the position of the throttle or butterfly valve.

Some carburettors have one or more auxiliary idling ports or the last of their progression ports, sometimes otherwise called "off-idle ports" or "transfer ports", positioned downstream or alongside the throttle valve in its closed idle position. Therefore even when a device is used to close the idling port, it is still possible for fuel/air mixture to be sucked through this additional port or ports from downstream of the throttle valve.

Accordingly an alternative manner of prevent fuel flow is to vent the region at the lower end of the passageway to normal atmospheric pressure so reducing or avoiding any suction of fuel along the idle port passageway.

According to this embodiment the idle mixture adjusting device includes means for venting to the atmosphere the region of the channel leading to the idling port near the idling port.

In another embodiment of the invention, the device may both block the idling port and vent to the atmosphere the region of the channel leading to the idling port.

It is also known to provide some form of solenoid-operated plunger to close the idling port when the ignition of a petrol engine is switched off so preventing the engine from continuing to work by diesel operation which can sometimes occur particularly when traces of carbon are present in the combustion chamber. Such an arrangement can readily be incorporated with a device according to the invention so that the tip of the device closes the idling port and/or the device vents that region, either way preventing the supply of fuel both during engine braking or deceleration and when the ignition is switched off.

According to another aspect of the invention, the invention also extends to the idle mixture adjusting device _per se_ for use as a replacement of the idle mixture adjustment screw. Therefore according to this aspect of the invention there is provided an idle mixture adjusting device for a carburettor for an internal combustion engine comprising a body having an outer screwthread to enable it to be screwed to the idle mixture adjusting screw hole of a carburettor, a pointed/tapered tip projecting into the channel and manually movable to move the tip towards and away from the port to set the idling mixture of the engine, and operating means forming part of the idle mixture adjusting device for moving the tip towards the said idling port to close it and/or venting to the atmosphere the region of the tip during periods of engine deceleration.

The invention will now be described, by way of example, with reference to the accompanying drawings, in which:

Figure 1 is a diagram of a carburettor in accordance with the invention;

Figure 2 is an enlarged view of a portion of that carburettor in the region of the idle mixture adjustment screw but showing a device according to the invention in position during normal operation of the engine;

Figure 3 is a diagram similar to Figure 2 showing the device during engine braking or deceleration;

Figure 4 is a view of a modified device according to the invention;

Figure 5 is a diagram of another device according to the invention; and

Figure 6 is a diagram of yet a further device according to the invention.

The carburettor 10 shown in Figure 1 includes an induction air passage 12 which leads to the manifold (not shown) and in turn to the cylinders of an internal combustion engine (not shown). In the air passage 12 is a pivoted butterfly throttle valve 14 whose position is controlled in conventional fashion by he throttle. The pivoting of this valve between the closed position shown in the drawings and an open position controls the amount of air which can be sucked into the engine and this in turn entrains with it fuel from the carburettor to adjust the working output of the engine.

A fuel/air passageway 16 is positioned in parallel with the induction air passage 12 and has an air inlet orifice 18 at its upstream end, an inlet fuel jet 20 from a fuel reservoir 21, various progression ports 22 and 24 upstream of the valve 14 and an idling port 26 downstream of the valve 14. During idling conditions, the valve 14 is in the closed position shown and a small amount of air and fuel mixture passes along the passageway 16 and out through the idling port 26 into the air passage 12 downstream of the valve 14. The richness of this mixture during idling conditions is adjusted by an idle mixture adjusting screw device 27 which can be moved in or out relative the wall of the carburettor since it has an external screw thread 28 which mates with a threaded bore 30 in the wall of the carburettor (see Figures 2 and 3).

As the valve 14 progressively opens, more and more air can be sucked through the passage 12 and progressively more and more fuel is entrained through the progression port 24 and then the ports 24 and 22.

As thus far described, the carburettor 10 is conventional.

Referring now to Figures 2 and 3, the idle mixture adjusting screw device 27 comprises an outer sleeve 32 which has the external screw thread 28 in its outer surface mating with the threaded bore 30. Within the outer sleeve 32 is a central plunger 34 and between the plunger and sleeve is a compression coil spring 36.

The plunger has a tapered nose or tip 38 and the longitudinal axis of the plunger is aligned with the axis of the port 26.

The tip 38 is formed of a finely tapered portion 38a and a coarsely tapered portion 38b. The advantage of this is that the finer portion 38a which initially projects into the port 26 can be used to give a very fine adjustment of the idling mixture. However, when the tip 38 is to block the port 26, the coarser portion 38b then abuts around the edge of the idling port 26 and sits on a corresponding shaped seating 26a around the edge of the port so giving sudden closure of the port when required. In addition, this has the advantage that the coarser tapered portion is more unlikely to jam in the port than the finer tapered portion 38a. The plunger also has a solid cylindrical core 40 of smaller diameter than the internal diameter of the sleeve 32 and around which is positioned the spring 36. The core is a sliding/sealing fit within the left-hand end 42 of the sleeve which has a tapered, outer region which matches the tapered region on the tip of the plunger and a bore 44 which slidably carries the core 40. The end 42 of the sleeve also has a seating 46 against which the tip of the plunger abuts when in the position shown in Figure 2.

The spring bears against a cup-shaped washer 48 fixed to the end of the core 40 and urges the plunger to the open position of the device 27 shown in Figure 2.

Under normal operating conditions of the engine, the plunger 34 is in this open position and the device 27 operates in an entirely equivalent way to the idle mixture adjusting screw of a conventional carburettor. Thus, the tip 38 can be moved so as to progressively close or open the port 26 by rotating the sleeve 32 so moving the overall device 27 and its tip more to the left or more to the right to adjust the richness of the fuel/air mixture during idling conditions.

Extending longitudinally from the tip 38 of the plunger is a bore 50. This communicates with a radial bore 52 which in turn communicates with the region between the sleeve 32 and plunger 34 in the region containing the spring 36.

Fixed to the end of the core of the plunger is a diaphragm 56 which is in turn sealed to a flared end 58 of the sleeve. The diameter and flaring of this end of the sleeve and the diameter of the diaphragm are chosen so as to give sufficient force to overcome the effect of the compression spring 36 when the pressure between the sleeve and piston reduces to a preselected figure below atmospheric pressure.

During the existence of a high "vacuum" in the passage 12, e.g. a vacuum of the order of 20 to 26 inches (51 to 66 cm) of mercury caused by engine deceleration or engine braking, air from the region between the sleeve 32 and plunger 34 is exhausted through the bores 50 and 52. When this pressure is sufficiently reduced, the diaphragm 56 will push the plunger to the left to the closed position of the device 27 shown in Figure 3 because of the excess atmospheric pressure on the diaphragm. As a result, the tip of the plunger closes the port 26 and stops all flow of fuel/air mixture through the port 26. Therefore, the possibility of incorrect combustion and potentially illegal pollution through the exhaust is prevented and in addition there is a saving in fuel.

Once the engine ceases to decelerate, pressure in the passage 12 rapidly increases and as a result the pressure within the region between the sleeve and plunger increases with air entering through the ports 50 and 52 and once the pressure has increased sufficiently, the spring 36 overcomes the excess atmospheric pressure applied to the other side of the diaphragm and moves the plunger back to the right towards the normal open position shown in Figure 2. Such a condition exists during engine idling or during normal driving conditions of the engine.

As will be appreciated, the device 27 according to the invention is relatively simple and cheap to construct and has the advantage that no significant change in the actual carburettor body itself or operation of the carburettor is necessary. Therefore, an existing carburettor can readily be adapted to conform to the invention by replacing the conventional idle mixture adjustment screw with a device 27 according to the invention.

Instead of providing a bore through the plunger 34, the pressure in the manifold can be sensed through a separate conduit from a tap on the manifold.

The modified device 60 shown in Figure 4 is similar to that described above in connection with Figures 2 and 3 except that no spring 36 is provided and the end cover 62 encloses the end of the device to provide a sealed region 64 on the outer side of the diaphragm 56. This region is evacuated to a calibrated low pressure to correspond to the "vacuum" in the manifold 12 at which the plunger is required to move from the open to the closed position actually shown in Figure 4.

It is found that the device 60, shown in Figure 4, can be made more sensitive and accurate as compared with the use of the spring 36 provided in the device 27 shown in Figures 2 and 3 to control the moment when the plunger moves between its open and closed positions.

Some carburettors have on an auxiliary idling port or the last of their progression ports positioned downstream or alongside the throttle valve in its closed position at or around the point 66 shown in Figure 1. As a result that even if the device 27 or the device 60 is used to close the idling port 26, it is still possible for fuel/air mixture to be sucked through this additional port from downstream of the throttle valve. Therefore, in these circumstances, the blocking of the idling port with a device 27 or the device 60 is not always completely effective. Instead the fuel/air mixture can be stopped from leaving the passageway 16 by a device which vents the region at the lower end of the passageway 16 to normal atmospheric pressure so reducing or avoiding any suction of fuel along the passageway 16. Such an embodiment will now be described in connection with Figure 5. Many modern vehicles have dual diaphragm distributors with which to retard the spark under idling conditions and open the butterfly valve 14 slightly under idling conditions. Because of this manifold pressure under idling is often higher than normal, e.g. 12 inches (30.5 cm) of mercury and as the throttle is opened slightly, the manifold pressure can reduce to 18 to 20 inches (46 to 51 cm) of mercury whilst under engine deceleration the pressure may be less than otherwise. If only pneumatic sensing is used to actuate the device as for example in the devices described in Figures 2 to 4, hunting may occur. As a result in the case of engines having these emission control techniques it is important to sense the deceleration condition of the engine electrically and/or mechanically and not actual manifold pressure. Further it is relatively simple and reliable to sense the deceleration condition of the engine electrically and so electrical sensing can be used with all devices of the invention, actuation of a solenoid by use to control the operation of the device.

The device shown in Figure 5 includes an idle mixture adjusting tube 100 screwed into the threaded bore 30 in the wall of the carburettor and a solenoid controlled valve 102.

The tube 100 has at one end a tip 104 arranged to project into the idling port 26. As with the device 27 described above, the tube 100 can be progressively screwed into or out from the threaded bore 30 so that the tip 104 adjusts the extent of opening of the idling port 26 and so controls the idling mixture of the engine.

The tube 100 has a longitudinal bore 110 terminating in small vent holes 112. At the outer end of the tube, the bore 110 is open and the open outer end of the tube is connected by a length of flexible tubing 120 to the valve 102.

The valve 102 includes a plunger 125, movable by means of a solenoid 122 to open to the atmosphere or close a port 124 which is in communication with the tubing 120. When the port 124 is opened, then the region of the passageway 16 is vented to the atmosphere through the tubing 120, bore 110 and vent holes 112. If desired a replaceable filter can be provided over the valve 102 to filter the air before it can enter the carburettor.

The carburettor shown in Figure 5 has an auxiliary idling port 24. Therefore blocking off the idling port 26 during deceleration may not prevent some fuel from being sucked into the manifold and so the region 128 at the lower end of the passageway 16 is vented to atmosphere by opening the valve 102 so as to avoid sucking petrol air mixture down the passageway 16.

The actuation of the solenoid 122 is controlled by a combination of an electronic engine speed switch 152, e.g. a pulse integrating chip, and a throttle position sensing switch 154 which controls a relay 160 in turn controlling the actuation of the solenoid 122. Under normal engine operation, i.e. engine speed greater than 1,000 rpm and the throttle open, the solenoid 122 is energised and plunger 125 is moved to the left in the sense shown in Figure 5 because the switch contacts 162 of the relay are closed.

During engine deceleration when the throttle valve 14 is closed the throttle position switch 154 is closed and the engine speed switch 152 is closed whilst the engine speed remains above 1,000 rpm. Therefore the relay 160 is energised which in turn opens its contacts 162 and de-energises the solenoid 122. This allows plunger 125 to move to the right in the sense shown in Figure 5 which opens up the port 124 so venting the region 128 to the atmosphere. This therefore stops the flow of fuel through port 26.

As engine speed drops below 1,000 rpm or the throttle is opened, the relay 160 is de-energised and in turn the solenoid 122 is de-energised so that the plunger 125 moves to the left in the sense shown in Figure 5 thus again allowing fuel to flow through the idling port 26 enabling the engine to run at idle speed or faster.

In some cases it may be desirable both to block the idle jet and vent the region near the base of the passageway 16. The device 250 shown in Figure 6 enables this to be achieved.

The device 250 shown in Figure 6 comprises an outer cylindrical sleeve 252 which has a threading to enable it to be screwed into the threaded bore 30 in the wall of the carburettor. Within the sleeve 252 is slidably mounted a plunger 254. This has at one end a tip 256 arranged to project into the idling port 26. The device 250 can be progressively screwed into or out from the threaded bore 30 so that the tip 256 adjusts the extent of opening of the idling port 26 and so controls the idling mixture of the engine.

The tip 256 is formed of a finely tapered portion 256a and a coarsely tapered portion 256b for the reasons described above in connection with Figures 2 and 3.

Formed to the outer end of the sleeve 252 is a solenoid casing 259 containing a solenoid 260. The movable core 262 of the solenoid is joined to and supports the plunger 254 so that it is slidable relative the outer sleeve 252.

The plunger is urged in its normal position towards the left as viewed in Figure 6 by means of a coil spring 270. Vent holes 272 are provided in the end of the casing 259 and core 262 so that a passage 273 between the plunger 254 and sleeve 252 is in communication with the atmosphere.

The plunger 254 has an additional seating 274 against which it sits on the end of the sleeve 252. When the plunger is in its open position shown in Figure 6, the seating 274 closes against the end of the sleeve.

The actuation of the solenoid 260 is controlled in exactly the same way as described above in connection with Figure 5.

The operation of the device 250 as far as blocking the idling port 26 is concerned, is more or less the same as for the device 27 as shown in Figures 2 and 3. Thus, during engine deceleration the solenoid 260 is de-activated and so the spring 270 moves the plunger to the left in the sense shown in Figure 6 and the portion 256b closes the idling port 26. This movement also opens the seating between the seating 274 and the end of the sleeve and so atmospheric air can now pass along the air passage 273 to the region 104 so reducing the suction effect at the lower end of the passageway 16 caused by the auxiliary port 24. The effect is therefore to prevent the passage of fuel/air mixture down the passageway 16 during periods of deceleration or engine braking.

When the engine reaches idling speed or the throttle is depressed, the solenoid is again activated and so the plunger moves back to the right to its original position shown in Figure 6.

Although the solenoid 260 is shown as actuating the plunger 254 directly it could do so indirectly by means of for example a flexible bowden cable connection from a solenoid positioned remotely from the carburettor if there is a difficulty in positioning the relative bulky solenoid close to the carburettor.

One advantage of the devices shown in Figures 5 and 6 is that they prevent dieseling of the engine once the ignition switch of the vehicle is opened. Thus, when the ignition of the vehicle is switched off, the solenoid is de-activated and automatically the region 104 is vented and/or the plunger closes the port 26 so preventing further fuel/air mixture from reaching the engine.

WHAT WE CLAIM IS:

1. A carburettor for an internal combustion engine comprising a throttle valve, an idling port through which a fuel/air mixture is supplied on the downstream side of the valve when the latter is in a closed position, a channel leading to the idling port and along which the fuel/air mixture is drawn, a longitudinally adjustable idle mixture adjusting device having a tapered tip projecting into the channel and manually movable to move the tip towards and away from the port to set the idling mixture of the engine, and means operable through the idle mixture adjusting device for preventing the supply of fuel through the idling port during engine deceleration.

2. A carburetor as claimed in Claim 1 in which means are provided to move the said tip towards the said idling port to prevent the supply of fuel during engine deceleration.

3. A carburettor as claimed in Claim 2 in which the operating means comprise an electrically operated solenoid for moving the tip.

4. A carburettor as claimed in Claim 3 in which pressure sensing means are provided for detecting the pressure downstream and moving the tip to close the idling port when the "vacuum" downstream of the throttle valve exceeds a certain figure.

5. A carburettor as claimed in any preceding claim in which the idle mixture adjusting device has a port running from or near its tip to a pressure sensing device forming part of the said operating means.

6. A carburettor as claimed in any preceding claim in which the idle mixture adjusting device comprises an outer threaded sleeve capable of being screwed into the carburettor in place of the idle mixture adjusting screw, and a plunger longitudinally movable within the sleeve, the plunger having the tapered tip formed on an end projecting from that sleeve.

7. A carburettor as claimed in any of claims 1 to 4 in which electrical means are provided to sense engine speed and the throttle position, and those means are arranged to activate the device to prevent the supply of fuel through the idling port during engine braking or deceleration.

8. A carburettor as claimed in any of claims 1 to 4 in which means are provided for venting to atmosphere the region of the channel leading to the idling port near the idling port so as to prevent the supply of fuel during engine deceleration.

9. An idle mixture adjusting device for a carburettor for an internal combustion engine comprising a body having an outer screwthread to enable it to be screwed to the idle mixture adjusting screw hole of a carburettor, a pointed/ tapered tip projecting into the channel and manually movable to move the tip towards and away from the port to set the idling mixture

of the engine, and operating means forming part of the idle mixture adjusting device for moving the tip towards the said idling port to close it and/or venting to atmosphere the region of the tip during periods of engine deceleration.

10. A device as claimed in Claim 9 further comprising sensing means for engine deceleration including means sensing engine speed by measuring the rate of ignition pulses and electrical switch means for sensing the throttle position.

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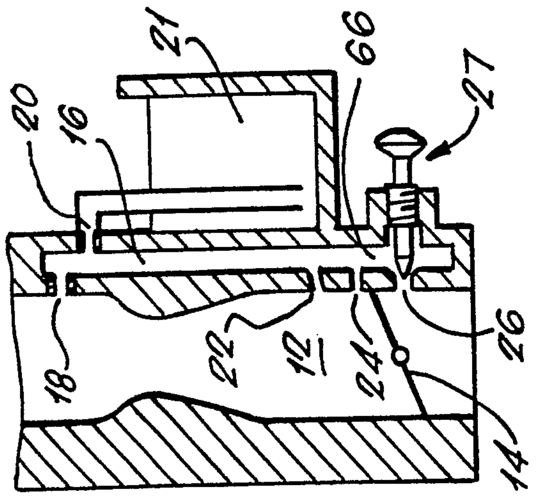


FIG.1.

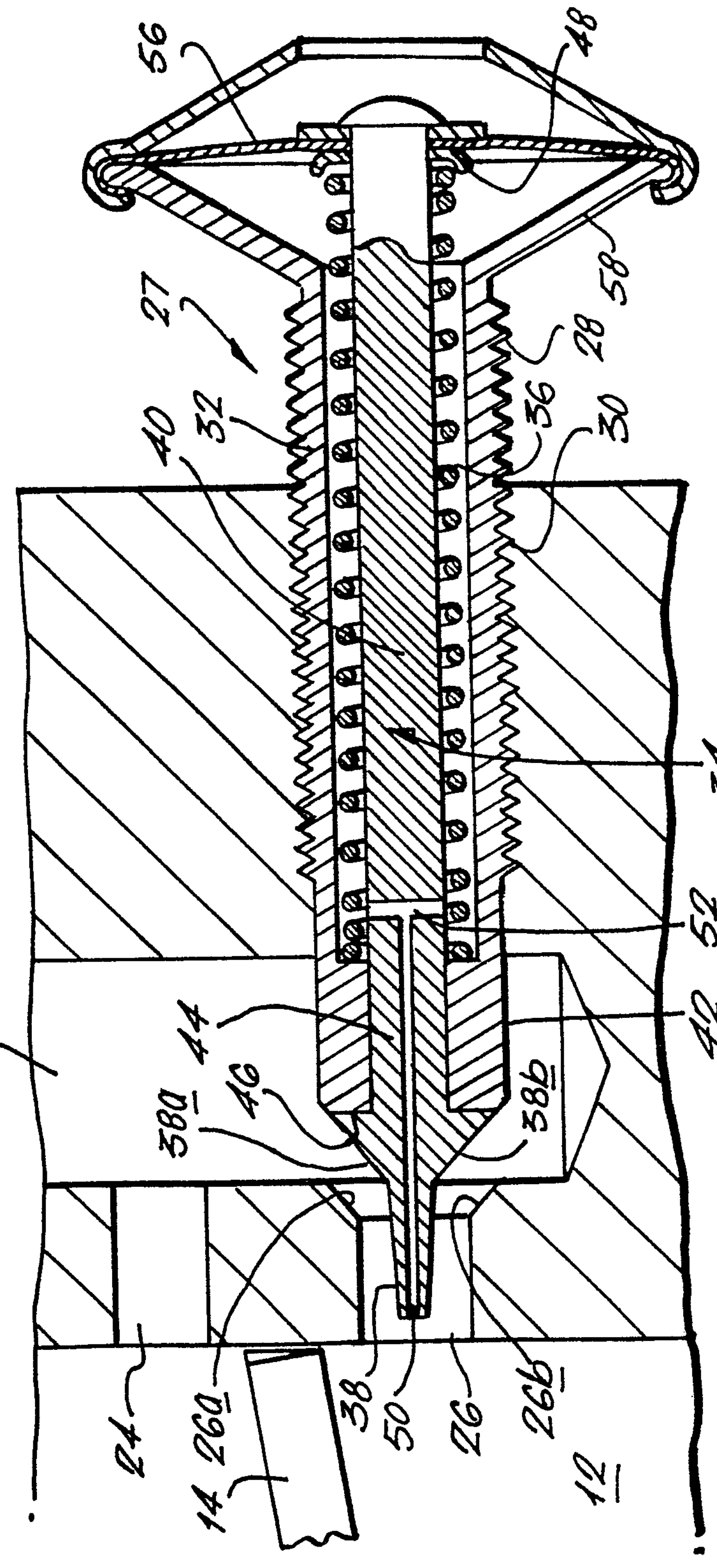


FIG.2.

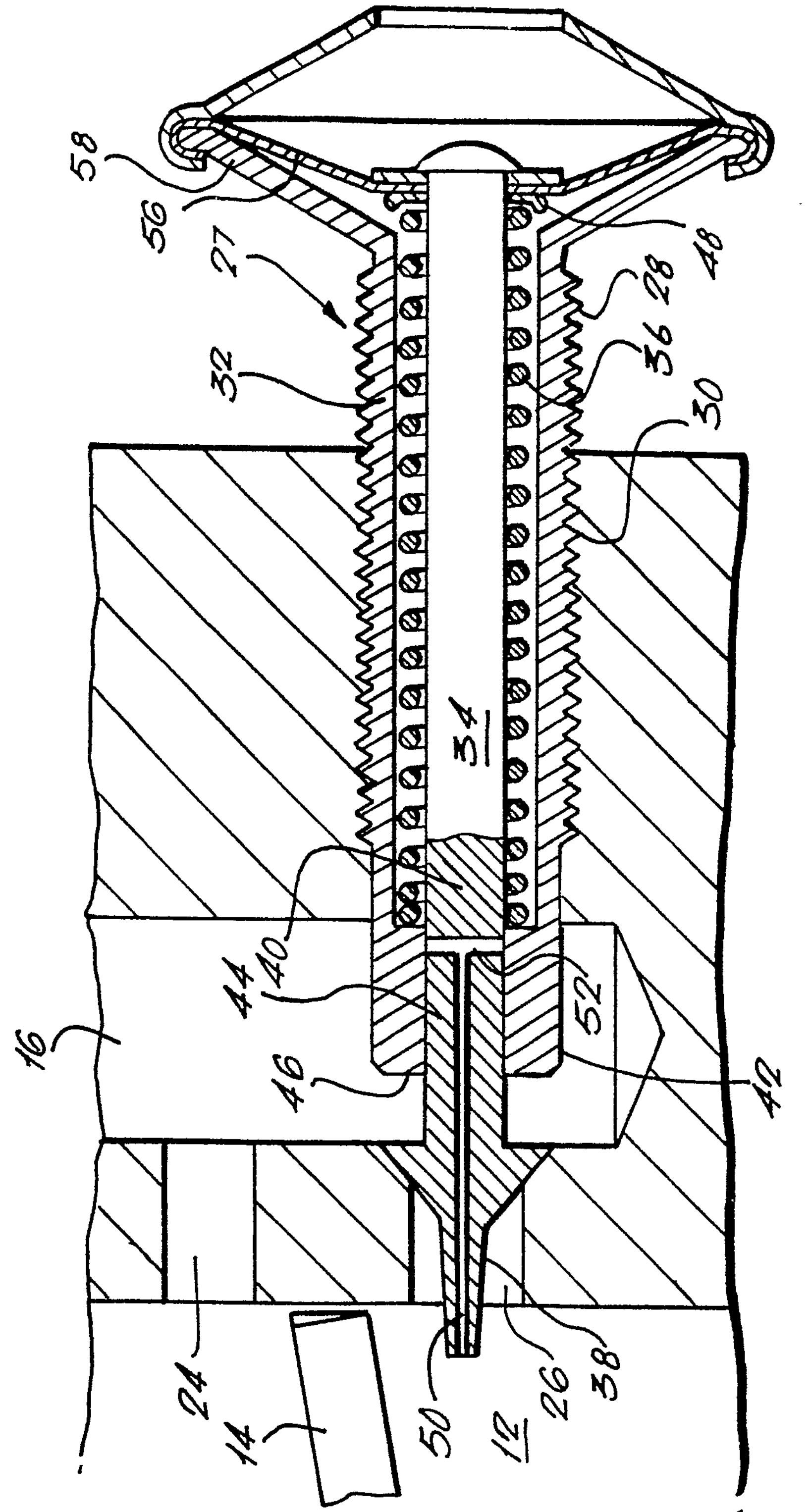


FIG. 3.

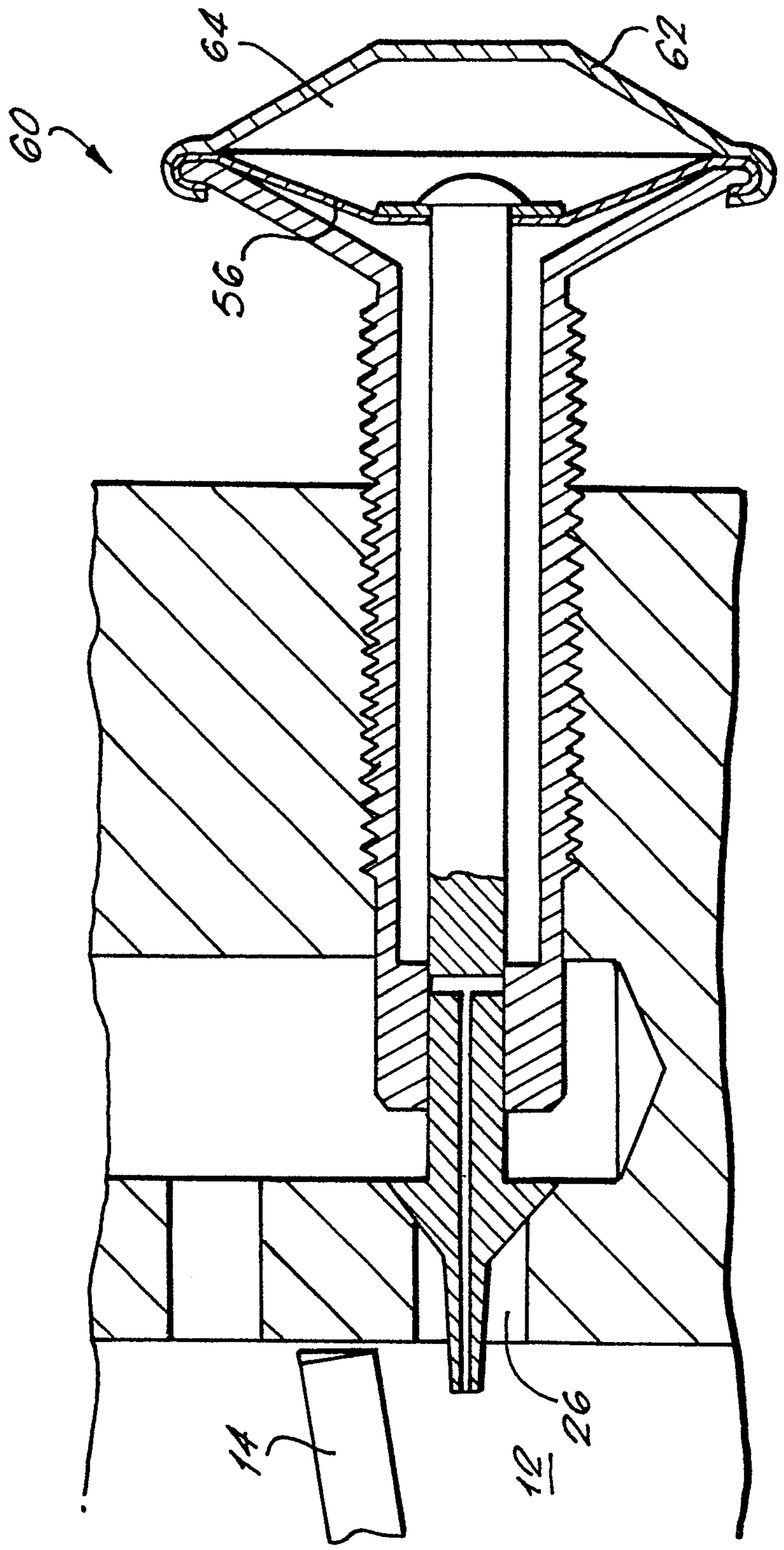
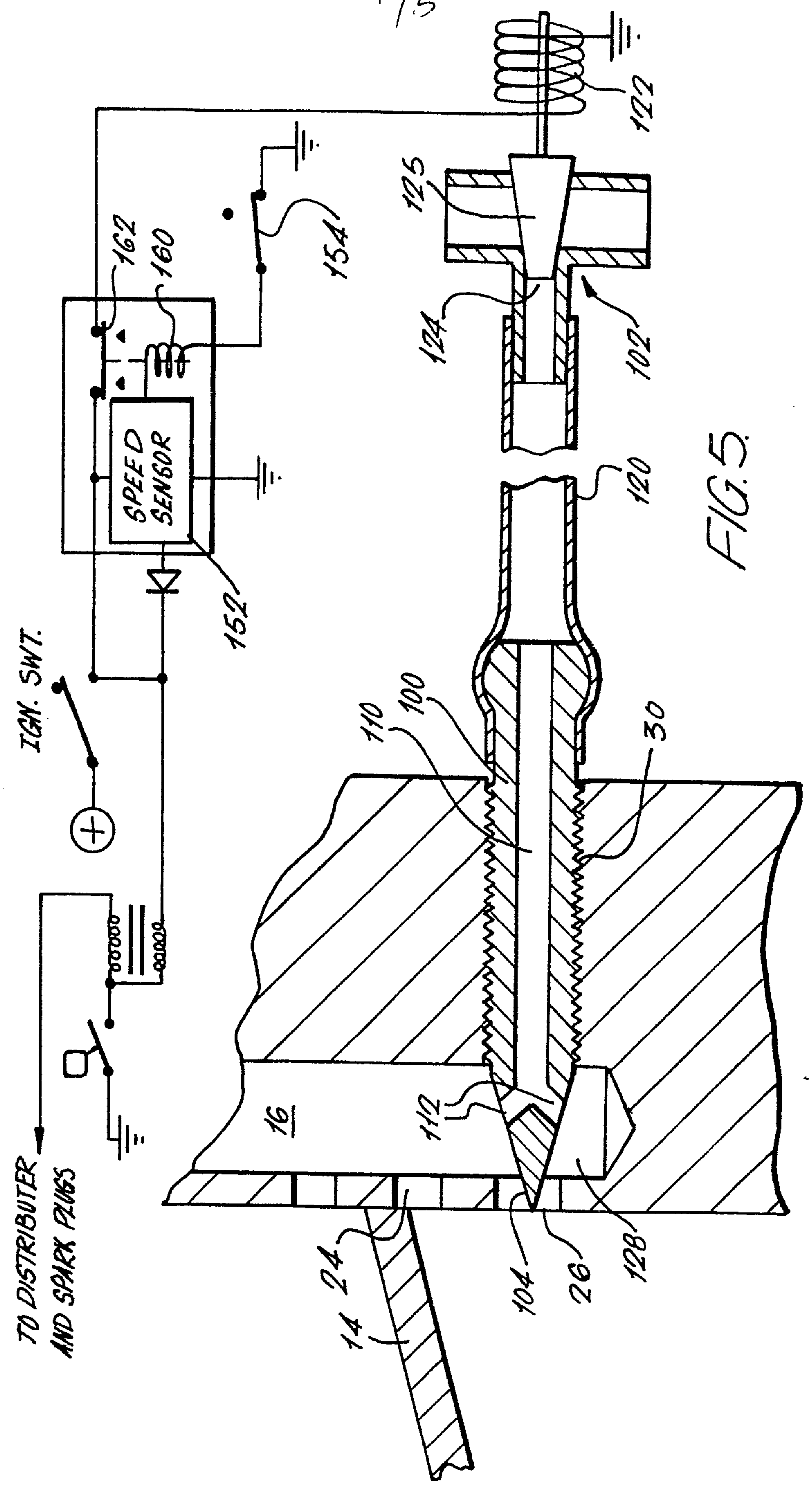


FIG. 4.



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160
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SPEED SENSOR
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IGN. SWT.
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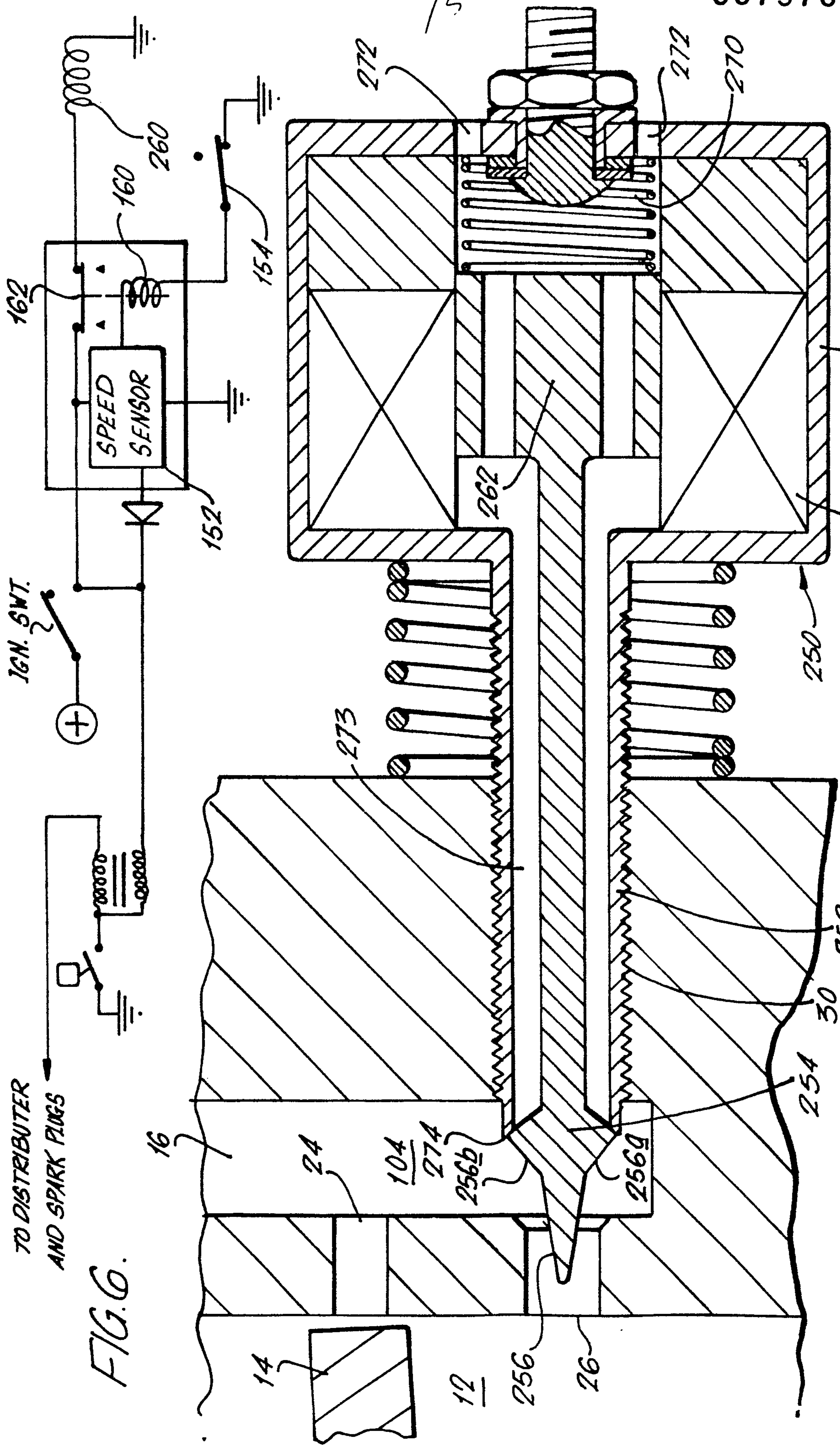
TO DISTRIBUTER AND SPARK PLUGS

FIG.5


TO DISTRIBUTER AND SPARK PLUGS
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260
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273
252
30
254
16
24
104
274
256b
256a
14
12
256
26

FIG.6.

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0079763
Application number

EP 82 30 6006

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. 3)
X	US-A-2 824 725 (DIETRICH) *Column 1, lines 15-20,59-71; column 3, line 21 to column 4, line 40* ---	1,2,4, 5,6,9	F 02 M 3/04
X	US-A-2 840 359 (CORNELIUS) *Column 1, lines 33-35,49-54; column 1, line 68 - column 3, line 27* ---	1,2,4, 5,6,9	
X	FR-A- 963 903 (BEZZI) *Page 1, lines 35 to page 2, line 8; page 2, lines 35-63; page 2, lines 83 to page 3, line 5* ---	1,2,3, 4,7,9	
			TECHNICAL FIELDS SEARCHED (Int. Cl. 3)
A	US-A-3 996 908 (GENERAL MOTORS) *Column 2, lines 62 to column 4, line 24* ---	1,2,3, 6,9	F 02 M
X	DE-A-2 526 408 (BECKER) *Page 3, lines 18-27; page 4, claims 1,5* ---	1,2,3, 5,9	
X	GB-A- 551 263 (FLEETWOOD) *Page 3, lines 24-51* --- -/-	1,2,3, 7	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	11-02-1983	TATUS W.D.

CATEGORY OF CITED DOCUMENTS

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DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. 3)
X	US-A-2 957 463 (SCHNABEL) *Column 1, lines 49-56; column 2, line 50 to column 3, line 24; column 4, lines 5-42* ---	1,3,9	
X	US-A-3 823 699 (ADAIR) *Column 2, lines 1-43* ---	1,9	
X	US-A-2 939 444 (LEIBING) *Column 5, line 61 to column 6, line 24; figure 2* ---	1,9	
A	CH-A- 515 416 (NAGGIAR) *Page 3, line 19 to page 4, line 23* ---	1,3,7,9	
A	US-A-3 297 103 (WALKER) *Column 2, line 28 to column 3, line 13; figure 1* ---	1,2,3,7,9	TECHNICAL FIELDS SEARCHED (Int. Cl. 3)
A	GB-A-2 089 895 (PIERBURG) *Page 1, lines 3-14; page 1, line 95 to page 3, line 84* ---	1,2,4,9	
A	GB-A-1 099 350 (S.I.B.E.) *Page 2, lines 3-83; figures 1-7* -----	1,2,3,9,10	

The present search report has been drawn up for all claims

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