Dec. 13, 1932. H. V. DALGLIESH 1,890,497

APPARATUS FOR AFFECTING THE PHYSICAL CONDITION OF GASES

Filed Sept. 23, 1930

Fig. 1.

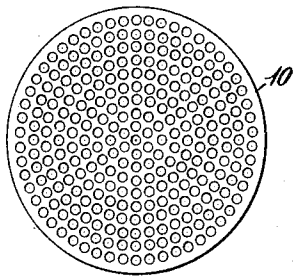
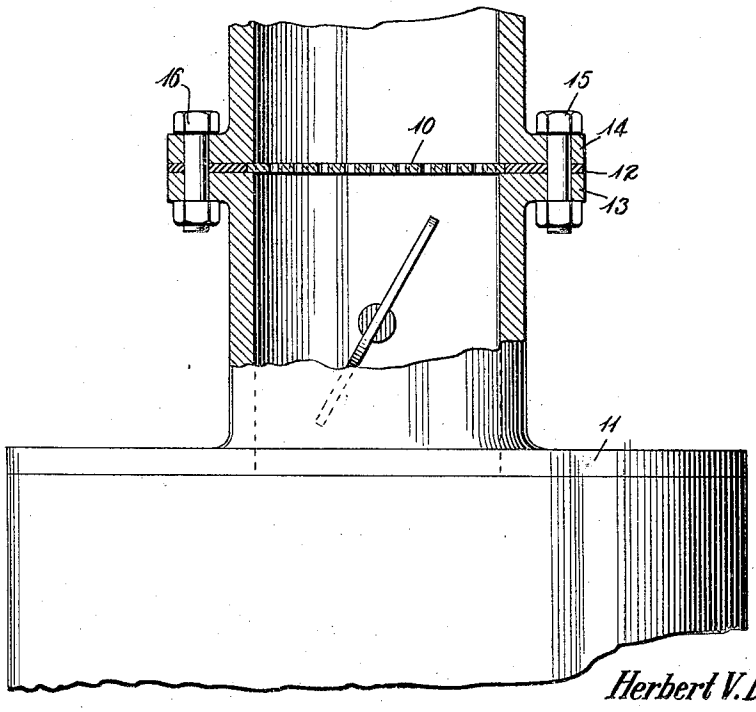


Fig. 2.



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UNITED STATES PATENT OFFICE

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APPARATUS FOR AFFECTING THE PHYSICAL CONDITION OF GASES

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The invention relates to apparatus for treatment of gases and has as an object to so treat gases as to place them in a condition for more efficient or more active chemical change.

It is a further object of the invention to provide apparatus for so treating gases or a mixture of gases as to place the same in a condition of persisting turbulence whereby more active or efficient chemical change may be effected throughout the mass.

It is a further object of the invention to make an application thereof particularly to the explosive mixture fed to the combustion chambers of an internal combustion engine.

It is a further object of the invention to improve the operation of an internal combustion engine.

It is a further object of the invention to improve the fuel efficiency of an internal combustion engine.

Further objects of the invention will appear from the following description when read in connection with the accompanying drawing showing an illustrative embodiment of the invention, and wherein:—

Fig. 1 is a plan view of a plate for carrying out the invention drawn substantially to scale; and

Fig. 2 is a vertical section through an intake manifold showing the application of a plate thereto in accordance with one manner of application.

In accordance with the invention, the plate as in Fig. 1, shown for purposes of illustration as being circular in outline, is formed with a plurality of perforations which it has been discovered must be of a certain size within rather close limits and which must be so spaced in the plate as to provide a total area of perforations which cannot be departed from to a great extent without losing the advantages of the invention.

I am aware that perforated plates for use in gas engines in the manner contemplated by the present invention have been proposed in a considerable variety of forms and I have made extensive experiments with plates of this character. As the result of such experiments and the carrying out of comparative tests thereon, the plate of the invention was discovered. These tests indicate that to secure the advantage desired the perforations must be very close to 3/32 inches in diameter and that a variation in the diameter of the holes of more than 1/64 of an inch in either direction from this dimension will cause substantial failure to secure the objects of the invention.

I have further discovered that the number of holes in the plate to secure the best results should be such that their combined area is substantially 62½% of the total exposed area of the plate and further that if this percentage is increased to about 70% or reduced below 50% of the exposed area of the plate, the objects of the invention are substantially defeated. Within the limits of dimensions of the holes and combined area thereof indicated, some advantage is secured by the invention and the best results in accordance with the tests referred to as applied to internal combustion engines are found at very closely the preferred percentages described.

It is further found that using holes 3/32 of an inch in diameter of such a number that the combined area of holes occupies 62½% of the area of the plate, the thickness of the plate for best results is 1/16 of an inch and must not be less than 3/64 or more than 5/64 of an inch, in other words, two-thirds of the diameter of the holes. If the diameter of the holes, when the invention is applied to internal combustion engines, is varied from the preferred size of 3/32 of an inch, the variation is less deleterious if the thickness of the plate is also varied to preserve the ratio of 2 to 3.

The plate has been illustrated as circular in outline but this shape is not essential to the invention and obviously the plate should be made of an outline such as to conform to the outline of the passage or opening to which it is applied.

As illustrated the plate is formed with a rim outside of the openings which is wider than the spaces between the openings. The overall dimension of the perforated portion of the plate measured at the outer portion of

the perimeter of the outer openings should be substantially equal to the inner dimensions of the passage or opening to which the plate is applied so as to not choke the passage but to act upon the mixture of gases to cause the same to pass through the openings over the whole of the passage.

Tests have further been carried out with the invention as applied to internal combustion engines, to determine its effect when the plate is applied to a motor in various positions and it is found that the objects of the invention are attained in substantially the same degree no matter where the plate is applied. For instance a separate plate has been applied to each of the intake openings to the combustion chamber of each cylinder and a motor tested and the tests compared with a single plate placed in the gasket between the carburetor and intake manifold, which comparison shows that the location of the plate is substantially immaterial. Naturally since the last referred to location requires a single plate to act upon the flow of the entire fuel supply to a single manifold engine or but two plates to apply to a dual manifold carburetor, as used with the more recent multiple cylinder engines, it is preferred to place the plate or plates immediately at the carburetor.

In the application of the plate indicated at 10 above a carburetor as 11, the usual gasket 12 placed between the manifold and carburetor has its opening sufficiently enlarged to receive the plate, the outer diameter of the plate being sufficient as already pointed out to extend beyond the inner wall of the fuel passage and the gasket having the plate enclosed therein is confined between the flange 13 of the carburetor and the flange 14 of the manifold and clamped thereto by the usual bolts 15, 16.

In the comparative tests of the completed invention above referred to as applied to internal combustion engines, various makes of motors have been tested for fuel consumption upon measured quantities of fuel with and without the plate in place, the adjustments of the carburetor both with and without the invention were such as to give the best performance of the motors and such tests have indicated better than 15% increase of mileage on fuel consumption and in some instances as high as 25%.

In addition to the improvement of the fuel consumption and the fact being responsible for said increased efficiency, it is found that the motor operates better with the invention installed therein, the difference in operation being displayed in a greater flexibility of the motor, better starting and less need of choking the motor to cause the same to perform when it is being started cold. Included in the term "flexibility" as above used is the property of delivering a greater torque at slow speeds of the motor.

It is at present impossible to state with certainty the reason for the results secured by the invention. It seems probable that these results are due to two factors. First, the production of a persisting turbulence in the gases; and second, when applied to a mixture of liquid fuel and air, as in an internal combustion engine, the reduction of any droplets of liquid in the mixture to such a predetermined size of mist particles, that the particles do not recombine into droplets before they are ignited.

The facts, that the results are the same whether plates of the invention are placed at each of the openings in the engine block directly communicating with the intake valve chamber or such a plate is placed closely adjacent the carburetor, and that the results are destroyed if plates are placed at both said positions so that the mixture passes through the plates in series, seem to support both said factors. The particular type of turbulence engendered undoubtedly acts to the production of the mist particles referred to when such fuel droplets are present in the gases.

The dimensions and number of openings and the thickness of the plate may be varied within the limits indicated herein without departing from the spirit of the invention and within the scope of the appended claim.

I claim:

Apparatus for affecting the physical condition of gases comprising a perforated plate to be placed in a stream of gas in such relation that the gas flows through the perforations, the perforations being each substantially three thirty-seconds of an inch in diameter, the number of perforations being such that their combined area constitutes substantially sixty-two and one-half per cent of the exposed area of the plate and the thickness of the plate being substantially one-sixteenth of an inch.

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