May 19, 1931. W. M. MALOUF 1,806,406

ATTACHMENT FOR INTERNAL COMBUSTION ENGINES

Filed March 20, 1928

Fig. 1.

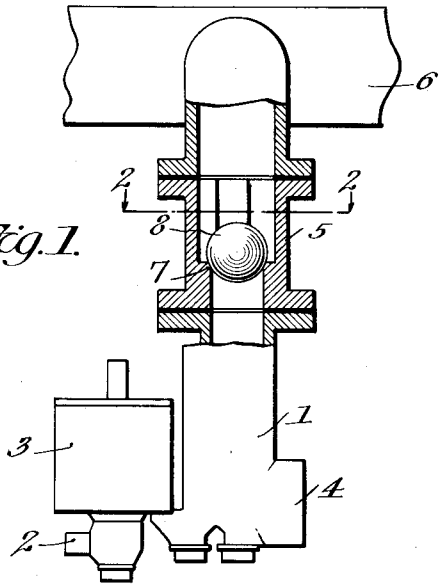


Fig. 2.

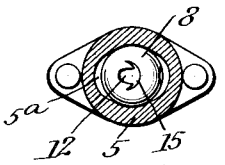


Fig. 3.

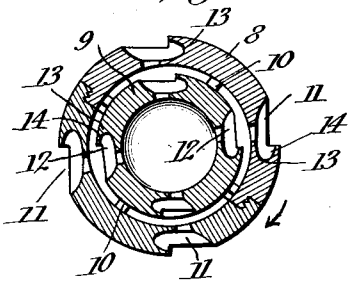


Fig. 4.

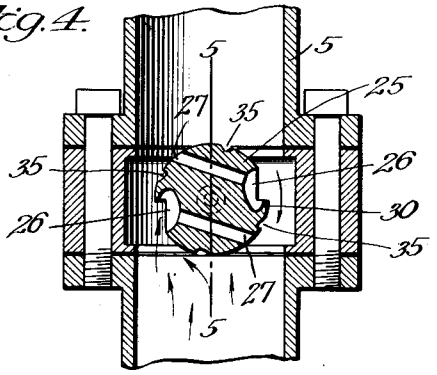


Fig. 5.

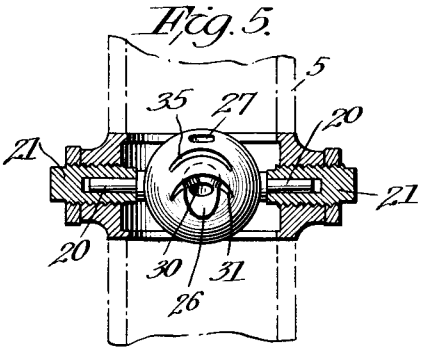
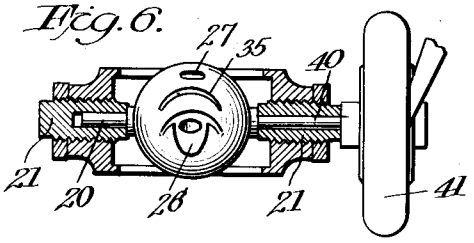


Fig. 6.



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UNITED STATES PATENT OFFICE

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ATTACHMENT FOR INTERNAL COMBUSTION ENGINES

Application filed March 20, 1928. Serial No. 263,151.

The present invention relates to improvements in attachments for internal combustion engines, and the object thereof is to provide means for treating the air which constitutes a part of the combustible mixture supplied to the engine manifold, either prior to its being admixed with hydrocarbon or after the carbureted mixture is produced so that the percentage of hydrocarbon required in the mixture will be less than has heretofore been necessary.

Tests of the means hereinafter described have demonstrated that by it a material saving in the amount of hydrocarbon required to operate an engine is effected.

As shown, the invention is applied to the conduit connecting a carburetor with the intake manifold of an internal combustion engine and consists essentially of means whereby a combustible mixture delivered from the carbureting apparatus will be so agitated that a very intimate mixture of air and gas is provided and, as previously noted, the proportion of hydrocarbon required to provide a suitable explosive mixture is greatly reduced from that commonly found to be necessary.

In the accompanying drawings:

Figure 1 is an elevation and partial section of an embodiment of the invention.

Figure 2 is a section substantially on the line 2—2 of Figure 1.

Figure 3 is a sectional view through the agitating device, on an enlarged scale.

Figure 4 is a sectional view through a portion of the mixture conduit and the agitating device, the latter being of slightly different form from that of Figure 3.

Figure 5 is a vertical section substantially on the line 5—5 of Figure 4, the agitating device being shown in elevation.

Figure 6 is a view similar to Figure 5 illustrating a slightly different embodiment.

Referring to the drawings, 1 designates a carburetor which may be of any suitable type, and is, therefore, illustrated more or less diagrammatically. As usual, this is shown as comprising a hydrocarbon supply pipe 2, the outlet from which is controlled by a suitable float valve in a chamber 3 and the air inlet to the carburetor is at the end 4. A conduit 5 is, as usual, provided for connecting the discharge outlet of the carburetor 1 with the intake manifold 6 of an internal combustion engine.

In the embodiment of the invention illustrated in Figure 1, the conduit 5 or member thereof intermediate the manifold 6 and carburetor 1 is provided with a seat 7 on which rests, when the engine is inactive, a spherically-shaped agitating body 8.

The agitating device 8 may be of various forms, and the function thereof is to break up the stream of mixture passing through the conduit 5 into a plurality of streams, some of which are caused to move centrifugally of the axis about which the spherically-shaped body 8 turns so that they will intersect each other, such intersecting of the several component streams acting to break up the particles composing the same and effecting a very thorough mixing of the air and hydrocarbon.

As shown in Figure 3, the agitating body is composed of an exterior member 8 and an interior member 9, which are connected by radially arranged studs 10 so that relative movement between them is prevented. Each member of the agitating device is provided with a plurality of perforations which are preferably made in substantially the manner shown. That is, the members 8, 9 are each provided with exterior recesses 11, 12 which are elongated somewhat in the direction of rotation of the body and the forward end 13 of each recess extends beneath a lip 14 formed in the body. The parts 13, 14 therefore constitute an abutment against which the stream of mixture flowing from the carburetor through the conduit 5 will impinge so as to impart a rotary movement to the agitator. The inner end of each perforation is in the form of an elongated slot extending substantially parallel to the axis of rotation of the agitator.

The edge of the lip 14 of each of the recesses is extended somewhat beyond the sides of the body of the recess to provide an interrupted crescent-shaped groove, as shown at 15. As the stream of mixture passing through the conduit 5 strikes the abutments

formed by the forward ends of the recesses 11, the agitator will be lifted from its seat and caused to rotate in the direction indicated by the arrow in Figure 3 and portions of the streams passing through the perforations therein will be discharged from the interior of the body in a series of tangential streams. The rotation of the agitator will depend upon the speed at which the engine is operated, and it will be seen that the result will be that the tangentially projected streams of mixture will intersect each other and also the streams which move past the outside of the agitator from the carburetor to the manifold so that the streams will be broken up and the particles of air and hydrocarbon thoroughly intermingled.

In the embodiment of the invention illustrated in Figures 1 to 3, the agitating device will be lifted slightly from the seat 7 by the suction created in the manifold by operation of the engine or by pressure under which the air is supplied and will rotate in the stream without contact with the wall of the conduit, or without friction. The form of agitating device illustrated in Figures 1 to 3 will probably be found preferable when a supercharger is employed with an internal combustion engine having an embodiment of the invention applied thereto.

In the embodiments of the invention illustrated in Figures 4 to 6, the spherically-shaped rotating agitator is mounted on diametrically opposite trunnions 20 journaled in suitable bearings 21 provided in the conduit 5.

In this embodiment of the invention the agitator 25 is in the form of a solid body, the perforations therethrough being formed by recesses 26, similar to the recesses 11, 12 before described, and ducts 27 which extend through the body 25. The outer ends of the ducts 27 have the same shape as the inner ends of the perforations in the form of agitator previously described, that is, are shaped as elongated slots which extend substantially parallel to the axis of the trunnions 20. The overhanging lip 30 of each recess 26 is part of a crescent-shaped groove 31 corresponding to the groove 15 of the form shown in Figures 1 to 3, and in the exterior surface of the rotary member 25 between said lip and the adjacent outlet end 27 of another of the perforations, is formed an abutment 35. This is preferably of substantially crescent form and produced by making a suitable cut in the face of the body against which a portion of the fluid stream will impinge to assist rotation of the body.

It will be seen that owing to the form of the outer end 27 of the perforation duct, the fluid passing through such duct will be spread laterally as it emerges from the body which will assist in the agitation and commingling of the particles composing the stream.

As before indicated, it has been found that with engines operating at relatively high speeds, the rotatable agitator will be properly agitated to effect the desired results by the power created by suction through the manifold 6 or the pressure under which air is supplied. If, however, the improvements are to be applied to a relatively low speed engine it might be preferred to positively rotate the agitator.

Such an embodiment of the invention is illustrated in Figure 6. In this one of the trunnions supporting the rotatable agitator is extended as a short shaft 40 and on this is secured a rotor, such as a small turbine, or other power unit, conventionally illustrated at 41. This may be rotated by power supplied by the exhaust from the engine or any suitable moving part of the motor, or, if desired, by an independent power device, not shown.

It is believed that the operation and advantages of the improvements will be readily understood from the foregoing description and the drawings.

The agitating body, rotating at a high speed, acts to homogenize the gaseous stream passing through the conduit or passage in which such body is arranged.

It has been found that by employing an agitating means of the character shown, the mixture stream will be rendered so efficient that the amount of hydrocarbon required to be supplied to the carburetor in proportion to the air, is much less than has been necessary with the devices heretofore proposed or employed.

The effect of the rotating action of a device such as hereinbefore described on the air component of the mixture supplied to the engine is most marked. It imparts to such air a dynamic or vitalizing effect which enables a very much larger percentage of air to be used in the combustible mixture than has heretofore been possible. Marked beneficial effects have been obtained when the agitating means is caused to operate on the air supplied to the carburetor air inlet 4 and the action of the embodiment illustrated may be supplemented by so locating the agitator.

A decided reduction in the amount of hydrocarbon required in a fluid mixture is effected when the improved agitator is located in advance of the carburetor air inlet, even if such a device is not included in the mixture conduit between the carburetor and engine manifold.

As shown in Figure 2 the chamber or conduit in which the agitator is arranged is preferably made of elliptical form in cross section the shortest diameter thereof being very slightly in excess of the diameter of the agitator while the longer diameter is such that substantially diametrically opposite channels 5^a are provided.

I claim:

1. A gaseous fuel homogenizing means comprising a conduit adapted to be connected with the intake manifold of an internal combustion engine, and a body of substantially spherical shape within said conduit and free to rotate in any direction therein, said body being provided with means with which the gaseous stream passing through the conduit will co-act to rotate the body, for the purpose described.

2. The combination with a gaseous fuel supply conduit or passage connected with the intake manifold of an internal combustion engine, of a body of substantially spherical shape arranged within said passage for unrestricted rotation in any direction therein, the surface of said body being provided with a plurality of abutments with which the gaseous stream passing through the conduit will co-act to rotate the body, for the purpose described.

3. A gaseous fuel homogenizing means comprising a conduit or passage adapted to be connected with the intake manifold of an internal combustion engine, and a body of substantial spherical shape mounted for unrestricted rotation within said conduit, the surface of the body being provided with a plurality of depressions or cavities arranged in concentric relation to a common axis, whereby the body will be rotated about said axis by the gaseous stream passing through the conduit, for the purpose described.

4. A gaseous fuel homogenizing means comprising a conduit adapted to be connected with the intake manifold of an internal combustion engine, and a perforated body of substantially spherical shape within but disconnected from the walls of the conduit to permit free rotation, each end of the perforation in said body being elongated circumferentially to provide an abutment opposing the passage of the stream of gas through the conduit, for the purpose described.

5. A gaseous fuel homogenizing means comprising a conduit or passage adapted to be connected with the intake manifold of an internal combustion engine, and a substantially spherical shaped hollow perforated body within said passage and comprising a plurality of concentric spheres, connected to move together, each being perforated and provided with peripheral abutments, with which the gaseous stream passing through the passage will contact to effect rotation of the body.

In testimony whereof I have hereunto set my hand.

WILLIAM M. MALOUF.