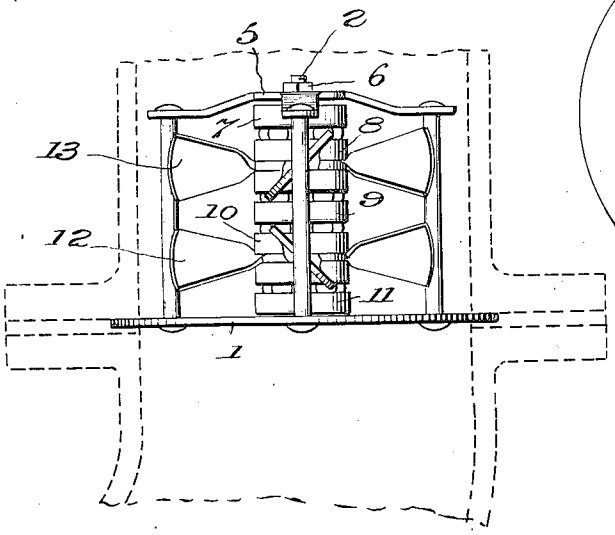
G. G. MOSELEY.

FUEL MIXING DEVICE FOR INTERNAL COMBUSTION ENGINES.

APPLICATION FILED JUNE 5, 1917.

1,259,266. Patented Mar. 12, 1918.

Fig. 1.



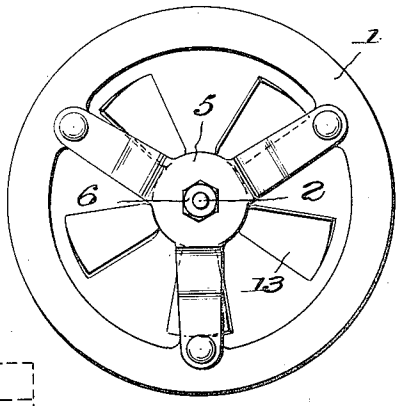


Fig. 2.

Fig. 3.

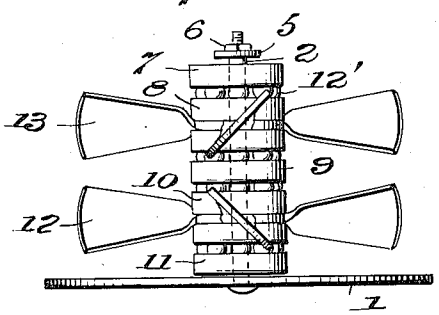


Fig. 4.

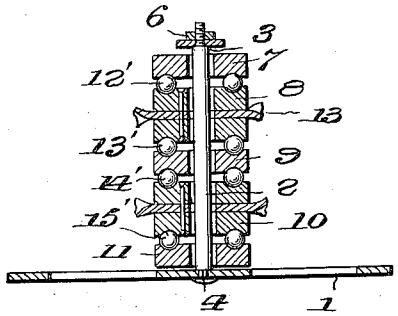
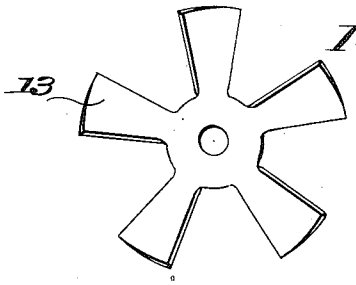


Fig. 5.



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FUEL-MIXING DEVICE FOR INTERNAL-COMBUSTION ENGINES.

1,259,266. Specification of Letters Patent. Patented Mar. 12, 1918.

Application filed June 5, 1917. Serial No. 172,873.

To all whom it may concern:

Be it known that I, GEORGE GILMER MOSELEY, a citizen of the United States, residing at Richmond, in the county of Henrico and State of Virginia, have invented certain new and useful Improvements in Fuel-Mixing Devices for Internal-Combustion Engines, of which the following is a specification, reference being had therein to the accompanying drawing.

My invention relates to internal combustion engines and has for its object the production of an efficient, self-contained agitating and mixing device which shall be applicable in standard form without change except as to dimensions, to any standard make of internal combustion engine, with especial reference to engines used in automobiles and motor boats.

According to standard practice, the combustible mixture for engines of this class is produced in a carbureter provided with gas or gasolene inlet and air inlet openings, separately adjustable, and an outlet provided with a butterfly valve or similar device for regulating the flow of the mixture into the intake manifold of the engine. This manifold and the carbureter being manufactured and assembled as separate parts, a flanged joint is provided for their union. As the complete power plant units come out of the shop, this flanged union is sealed so that the carbureter discharges directly through the intake into the combustion chambers, as determined by the intake valves of the respective cylinders. All mixing of the charge is done in the carbureter, although the vapor is not always heated to a proper temperature until after it reaches the manifold, which ordinarily becomes heated from the engine more quickly and more uniformly than the body of the carbureter. In order to heat the carbureter more efficiently, some designs locate it above the cylinder castings especially in the V type of engine for eight or twelve cylinders. In some cases special heating means are provided such as water jackets and the like. Even with these, however, no better incorporation of the gaseous ingredients of the mixture is produced than before, the improvement being limited in its effect to the more complete vaporization of the fuel while passing through the carbureter. During this vaporization phase, I have found it inadvisable to attempt a more intimate mechanical mixture partly because any further complication of the carbureter itself interferes with perfect adjustment which is absolutely essential to successful operation. I am aware that it has heretofore been proposed to place paddles or mixers in the carbureter, but for the reason stated, such arrangements have been found impracticable and so far as I am aware have been completely abandoned.

Exhaustive experiments have shown me that the most effective, and in fact the only reliable method of mechanically mixing the ingredients is to perform this operation either in or at the entrance to the intake manifold, and in such manner as not to impede the free flow of the vapor due to the suction of the engine, and particularly to throw it out so far as possible against the walls of the manifold, so as to take much of the heat transmitted therethrough and also to maintain a uniform density as well as composition throughout the entire advancing column.

It has been proposed heretofore to insert rotating fans or mixers in the pipe leading from the fuel supply to the engine. Such devices, however, have been unsatisfactory because of their failure to observe the only correct principle on which trustworthy action must depend, viz., that of complete absence of friction during rotation and particularly the high speed rotation of the mixer. When an engine is running at high speed, its suction is tremendous, and necessarily so as it must have large quantities of fuel quickly and easily supplied. Anything which checks or holds back the supply of fuel at such a time cuts down the efficiency of the engine to a far greater degree than any mixer would compensate for. As a corollary, it is essential that only such materials be employed in the construction of such a device, as will resist high temperatures and also the corroding and fouling action of the fuel vapors, which attack ordinary metals, particularly brass and steel, so as to render it impossible for rotation to continue, especially in ordinary bearings. Even ball bearings will foul to some extent, if the raceways be made of brass or steel, but I have found that these defects can be avoided, and excellent results attained by the use of Tobin bronze for the bearings, steel balls, and construction and adjustments such that in actual operation and especially at high speeds, which means un-

der the influence of strong vapor currents, the propellers or mixers will be lifted entirely off their bearings and literally float on the vapor currents. At such a time, contact, if any there be, is on the upper sides of the bearings and is very light, being due only to the factor of buoyancy, or the difference between the lifting power of the vapor and the downward pull due to the mass of the parts. The central spindle I prefer to make of steel for the sake of strength, and the steel balls employed are of course heat hardened. Since the Tobin bronze bearings not only resist heat but also resist corrosion and fouling, my structure will operate indefinitely without choking the engine and without any of the drawbacks mentioned. In order to render the flotation as easy as possible, even at moderate speeds of the engine, I make the propeller blades as elsewhere stated, of aluminum.

I attain my object and avoid the difficulties above recited by providing a flanged spider with a central vertical spindle, without any casing, and mounting directly upon this spindle a plurality of oppositely rotating mixers of very light metal, carried on hubs separated by spacing rings, with antifriction bearings between the adjacent faces of the hubs and spacing rings, and placing at the top of the spindle a retaining disk, so related to the upper spacing ring that a definite but limited amount of end play is permitted all the rotating parts, whereby the fan mixers will virtually float on the incoming current of gas and vapor and will be rotated thereby substantially without friction. This device, thus constructed as a self-contained unit, and so proportioned that the outside diameter of each fan circle will be almost equal to the internal diameter of the intake in which it is to be used, is inserted in the end of the intake pipe adjacent the carbureter, with its ring flange clamped in the flanged union above referred to.

By actual test, this device shows an economy of fuel up to 47 per cent. for the same mileage, on standard automobile engines such as for example that of the Cadillac eight. The fan blades are broadest at their outer ends, and are so shaped that in passing into the intake after leaving them, the vapor has a tendency to whirl outward after being thoroughly mixed, so that it comes constantly into contact with the heated walls of the intake pipe, and expands inwardly, whereby it not only gets the greatest possible heat effect before it reaches the engine, but also maintains an approximately uniform density of the advancing column of vapor in the pipe.

My invention is illustrated in the accompanying drawings in which—

Figure 1 is a side view of my invention, with stiffening posts.

Fig. 2 is a plan view of the same.

Fig. 3 is a side view of the preferred form of the invention, stripped of all parts that might obstruct the action of the fans.

Fig. 4 is a vertical sectional view through the spindle and connected parts of Figs. 1 and 3.

Fig. 5 is a plan view of one fan detached from its hub ring.

Referring to the drawings, 1 is a flanged spider base carrying a spindle 2 shouldered at its upper and lower ends as indicated at 3 and 4, the lower end being riveted or otherwise firmly secured in the center of the spider and the upper end carrying a cap disk and nut 5 and 6.

On the spindle 2 are loosely mounted the rotating bearing rings 7, 8, 9, 10 and 11. Between the adjacent faces of all of these rings are sets of steel balls respectively numbered 12′, 13′, 14′, 15′ which travel in raceways formed in the faces of the rings as shown in Fig. 4. The rings 7 and 11 are cap and foot rings respectively, serving the purpose of end bearing pieces and also as distance pieces to keep the fan hubs spaced away from the spider and the cap disk respectively. The ring 9 is a separator ring, keeping the fan hubs away from each other and furnishing an additional antifriction element between the opposite rotating fans. The rings 8 and 10 are the fan hubs and are double, that is to say each is made of two rings riveted together with the hub disk of the fan blades between them.

The spider 1 and the spindle 2 are of high grade tool steel, the rings 7 to 11 are of Tobin bronze and the fans and their hubs are of aluminum.

The reason for making the spindle and spider of the finest steel is that these are the parts that must remain in accurate quadrature, the spindle being accurately centered in the intake pipe in order to maintain proper centering of the fans. The reason for making the rings of Tobin bronze is because they not only must stand wear but they must resist heat. The rate of rotation of these rings and the fans is from 1800 to 3600 R. P. M., or even more. It is estimated that on some types of engine, such for example as the Marmon racer and others with a long stroke and a large bore, the rate of rotation of these fan blades rises to 7,000 per minute. It is quite apparent that as the efficiency depends upon unimpeded supply of the fuel in these cases, the slightest sticking or impedence on the part of the mixer would practically cripple the engine.

Each of the fans or mixers as 12 and 13 is punched out of sheet aluminum in one piece as shown in Fig. 5 and the blades are then bent in propeller form, the blades of the two fans 12 and 13 being right handed and left handed so that they will rotate in opposite

directions under the impulse of the passing current of gas.

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

A detachable self-contained device of the class described comprising a base ring and a vertical spindle supported at its end thereon, rotating rings mounted on the spindle, rotary fans carried on alternate rings, said rings having ball races in their adjacent surfaces, and two sets of ball bearings for each fan, one set between each adjacent pair of rings, each fan-carrying ring being in contact with the bearings on both sides when at rest, but entirely out of contact with the bearings on the lower side when in operation, the diameter of said ball bearings and the depth of the races being so proportioned in relation to the spacing during operation as to prevent unseating of the said bearings.

In testimony whereof I affix my signature.

GEORGE GILMER MOSELEY.