Apr. 3, 1923. 1,450,550

G. R. HUDSON

MIXER FOR GAS ENGINES

Filed Aug. 11, 1919

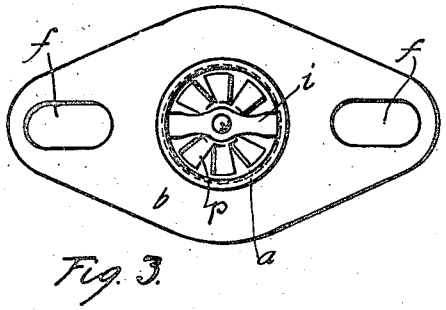
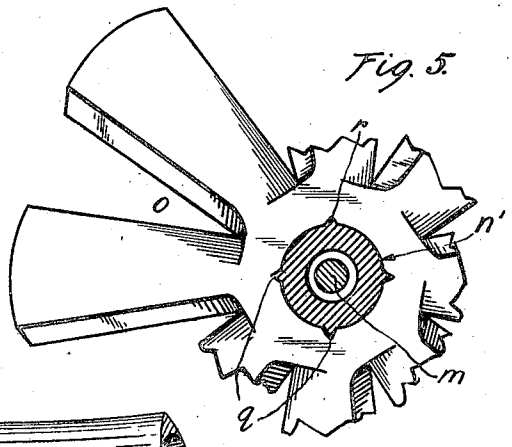


Fig. 3.

Fig. 5.



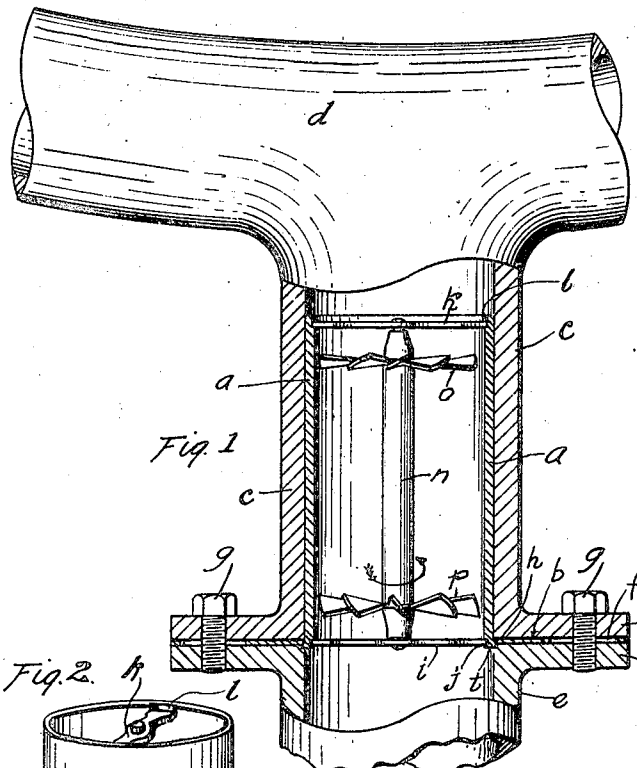


Fig. 1

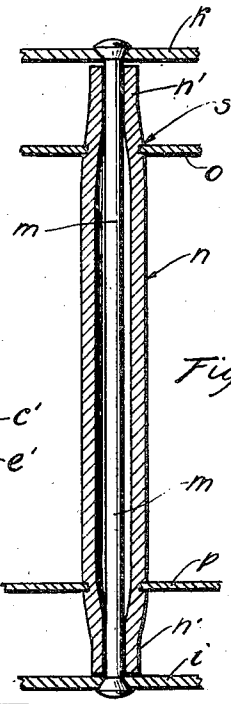
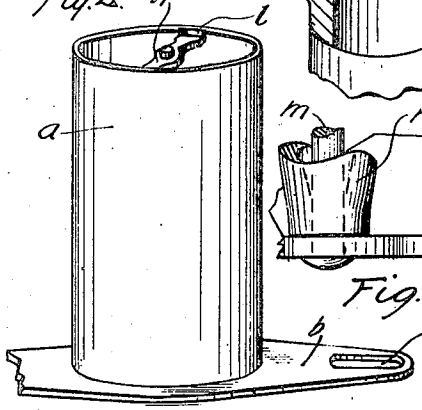


Fig. 4.

Fig. 2.



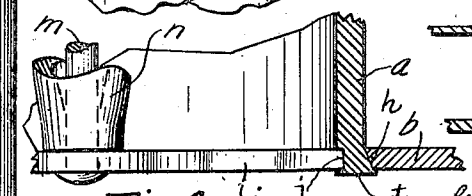


Fig. 6.

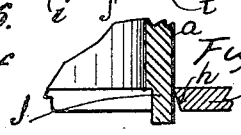


Fig. 7.

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Patented Apr. 3, 1923. 1,450,550

UNITED STATES PATENT OFFICE.

GEORGE R. HUDSON, OF PORTLAND, OREGON.

MIXER FOR GAS ENGINES.

Application filed August 11, 1919. Serial No. 316,894.

To all whom it may concern:

Be it known that I, GEORGE R. HUDSON, a citizen of the United States, and a resident of Portland, county of Multnomah, and State of Oregon, have invented a new and useful Improvement in Mixers for Gas Engines, of which the following is a specification.

My invention relates to fan-like agitators, or mixers, installed in the intake-pipe of the manifold of internal combustion engines, and revolving by the suction of the engine; functioning to break up the vaporized fuel oil and thoroughly intermix the air therewith.

Devices of this kind are recognized as producing a more efficient gas mixture for combustion, but the high speed at which these mixers were revolved as heretofore generally constructed, shorten materially their lives, and made them expensive because of the frequent replacement required.

The object of my invention is to produce a mixer revolving at a much less speed without decreasing its efficiency; in fact introducing a factor of greater efficiency by the novel features of my mixer.

I attain my object by mounting two fan-like devices on the opposite ends of a common shaft. The blades of these fans having a reverse pitch with respect to each other; hence the upper fan tends to rotate in a direction opposed to that in which the lower fan is being rotated by the suction of the engine. At the same time the revolving upper fan re-acts upon, and churns the gases, thereby breaking up and inter-mixing more thoroughly the particles of combustible gases with the air.

The opposed fans also have a tendency to producing a compression of the gases between them, and hence tending to heat the mixture and placing it in a better state for instantaneous combustion.

Another object of my invention is to provide a mixer of the type described which may be easily installed between the carburetor and intake side of the manifold of internal combustion engines.

A still further object of my invention is to provide an efficient, simple and inexpensively manufactured mixer, and which will not wear out in service too rapidly.

The details of construction and operation of my invention are illustrated in the accompanying drawings in which:—

Fig. 1 shows a sectional elevation of the intake pipe of the manifold, also of the abutting outlet end of the carburetor, with my mixer installed as in practice;

Fig. 2 is a perspective view of my device showing its appearance as manufactured for the market;

Fig. 3 is a bottom-end view of my device;

Fig. 4 is a sectional detail of construction illustrating the manner in which the fans are rotatably mounted in the casing;

Fig. 5 is a plan, partly in section, and drawn on an enlarged scale, illustrating the manner in which the fans are rigidly mounted on the hollow shaft; and

Figs. 6 and 7 are further details of construction, hereinafter fully described.

My mixer comprises a cylindrical casing *a*, provided at its lower end with a flange *b*. The dimensions of the casing *a* are proportioned to give my device a snug fit in the interior of the inlet pipe *c* of the manifold *d*. *e* shows the outlet end of the carburetor. The flange *b* of the casing *a* is adapted to be placed between the companion flanges *c'*, *c'* of the pipe *c*, and outlet *e*; and it is provided with elongate slots *f* to receive the screws *g*, and accommodate any variation in their position in said companion flanges.

I mount the casing *a* on its flange *b* by making the latter with an inwardly tapering edge *h* as shown in Fig. 7, and crimping the rim of the casing as shown at *t* in Figs. 1 and 6.

In the lower end of the casing *a* is rigidly mounted a cross-bar *i*. The latter is fixed in place by providing the lower end of the casing with a recess *j*, and crimping the walls of the recess, as shown in Fig. 6.

The upper end of the casing *a*, has mounted in it a cross-bar *i*, and, like the latter is seated in recesses *l* provided at the upper end of the casing *a*.

In the cross-bars *i*, *k* is rigidly supported a fixed shaft *m* on which is rotatably mounted a hollow shaft *n*. On the ends of the latter are rigidly mounted fans *o* and *p*. To facilitate the rigid mounting of the fans, the ends of the hollow shaft *n* are tapered as at *n'* and the fans *o* and *p* are forced over said tapered ends; the fans being made with recesses as at *q*, Fig. 5, such recesses form-

ing longitudinal ribs *r* on the periphery of said ends of the hollow shaft as the hubs of the fans are forced over them; the ribs fill said recesses; and finally the stock of the hollow shaft is mashed down so as to form a retaining flange over the hubs of the fans, as shown at *s* in Fig. 4.

The described details of construction are preferably followed by me because providing easy process of manufacture, and assuring durability.

The blades of the upper fan *o* have a pitch in the opposite direction from the blades of the lower fan *p*. And preferably the angle made by the blades of the two fans, respectively, with a plane normal to the axis of rotation are differentiated from each other; as for example the pitch of the blades of the lower fan may be adapted to make an angle of 45° with said plane, and the pitch of the blades of the upper fan *o*, may be adapted to make a lesser angle with said plane.

The operation of my device is as follows:—

As the gases enter the lower end of my mixer, the lower fan is rotated in a counter-clockwise direction, as indicated by the arrow adjacent such lower blade, thereby setting into motion a column of gases against the upper fan *o*, the latter if, free would have a clock-wise rotation, but being fast on the common shaft, *n* is rotated in the same direction as the lower fan *p*, and therefore tends to retard the rotation of the latter. At the same time the blades of the upper fan churn and agitate the enveloping gases, thereby tending to cause some compression of the column of gases located between the upper and lower fans; thus heating and further vaporizing the gases of such column and placing them in a better state for instantaneous combustion; finally the gases pass the upper fan *o* in a thoroughly mixed state.

While I have described my mixer as applied to the manifold of an internal combustion engine its uses are not limited to the latter.

I claim:

1. In a gas mixer of the character described, a mixing chamber, a shaft axially journalled in said mixing chamber, a fan rigidly attached at each end of the shaft, said fans being spaced apart a substantial distance, thereby providing a relatively large space between them, the lower fan having a pronounced pitch adapted to cause the shaft to be rotated by the gases drawn into the mixing chamber by the intake stroke of the engine, the upper fan having a lesser pitch than the lower one, and in the opposite direction to the latter, being thereby adapted to retard the passage of the gaseous mixture thru the mixing chamber, also serving to agitate the mixture of gases in the said space, and by the churning of said gases at the instant of their escape from said mixing chamber, producing a thorough intermixture of said gases.

2. In a gas mixer of the character described, a mixing chamber, consisting of a straight walled cylindrical body of a substantial length, provided at the base with an external lateral flange adapted to be placed between the flanges of the manifold to form a gas tight joint with the latter flanges, a shaft axially journalled in said mixing chamber, a fan rigidly attached at each end of the shaft, said fans being spaced apart a substantial distance, thereby providing a relatively large space between them, the lower fan having a pronounced pitch adapted to cause the shaft to be rotated by the gases drawn into the mixing chamber by the intake stroke of the engine, the upper fan having a lesser pitch than the lower one, and in the opposite direction to the latter, being thereby adapted to retard the passage of the gaseous mixture thru the mixing chamber, also serving to agitate the mixture of gases in the said space, and by the churning of said gases at the instant of their escape from said mixing chamber, producing a thorough intermixture of said gases.

GEORGE R. HUDSON.