F. M. WILLIS.

FUEL MIXER.

APPLICATION FILED OCT. 10, 1916.

1,254,100. Patented Jan. 22, 1918.

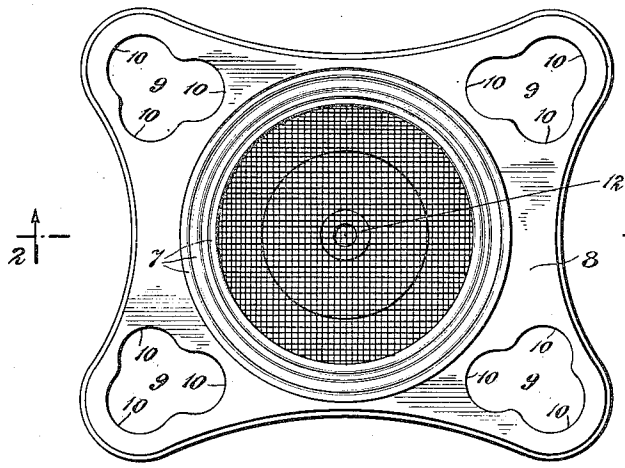


Fig. 1

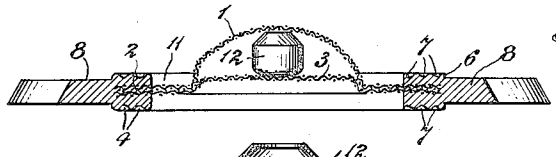


Fig. 2

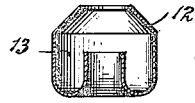


Fig. 3

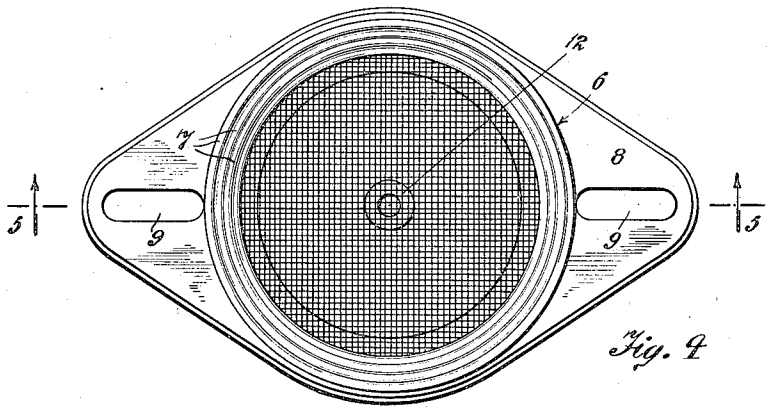


Fig. 4

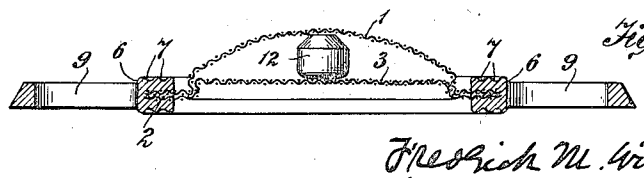


Fig. 5

Inventor

Frederick M. Willis

By his Attorney

Edward L. Beach

UNITED STATES PATENT OFFICE.

FREDERICK M. WILLIS, OF NEW YORK, N. Y., ASSIGNOR TO S.-P. VAPORIZER COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

FUEL-MIXER.

1,254,100. Specification of Letters Patent. Patented Jan. 22, 1918.

Application filed October 10, 1916. Serial No. 124,856.

To all whom it may concern:

Be it known that I, FREDERICK M. WILLIS, a citizen of the United States, residing at New York city, in the county of New York and State of New York, have invented certain new and useful Improvements in Fuel-Mixers, of which the following is a specification.

My invention relates to a vaporizer for use in internal-combustion engines between the gas supply and cylinder.

The main objects of the invention are to make the vaporizer sufficiently strong to withstand back-fire pressures; in such form that it can be readily fitted gas-tightly between the flange of a carbureter, and the flange of a manifold or cylinder intake pipe; in such manner that it has a non-disintegrable tubular spacer located between its screens and formed with a container for condensed gas; and in such manner that the binder gasket can be adjusted to a considerable number of different sizes of carbureter and pipe flanges. The latter feature however is not essential in all forms of the invention.

In the drawings,

Figure 1 is a top plan view of one form of my new vaporizer.

Fig. 2 is a cross-section thereof at line 2—2 of Fig. 1.

Fig. 3 is a top plan view of another form of my invention, and

Fig. 4 is a cross-section at line 3—3 of Fig. 3.

(The bolt-hole containing extensions of the binder-gasket shown in Figs. 4 and 5 are of an old form.)

Fig. 5 is a diametric sectional view of two coupled pipes in one of which one form of my vaporizer is shown installed.

Referring to the drawings, 1 is a concavo-convex screen of wire netting and formed with an integral flat annular flange 2. 3 is a concavo-convex screen of wire netting and formed with an integral flat annular flange 4. The screen flanges 2 and 4 are preferably of the same diameter, but the concavo-convex portions of the screens are made of different sizes so that they may be nested with the flat margins in contact one with another and with the concavo-convex portions spaced apart.

Prior to such assemblage an open ended or tubular troughed metallic spacer described below is located between the apical wall portions of the screens, and thereafter the superimposed screen flanges are compressed around their outer margins somewhat interlockingly together in order to hold the screens and the open ended or tubular troughed spacer in fixed assemblage for proper location in a mold wherein a lead or other soft and flat-wise compressible or edgewise deformable metal binder is die-cast in place to cover the screen margins both flatwise and edgewise. In this way a soft, tight-joint forming binder or gasket, hereinafter called a binder gasket 6, is readily and strongly formed in an economical manner.

The soft binder gasket has its flat opposed sides annularly corrugated at 7, and if not formed with integral extensions as shown, may be somewhat diametrically compressed or deformed to a slight extent if desired and sufficiently to permit it to be forced snugly into a pipe with its annular edge binding against the interior wall of the pipe for keeping the vaporizer immovable and from tipping therein. Such a mode of use is desirable in some forms of marine engines, and is illustrated in Fig. 5.

When the vaporizer is to be used between flanged pipes as commonly in internal-combustion engines for motor vehicles and aeroplanes, then the corrugated binder gasket will be compressed flatwise between the pipe flanges *b* and so make a tight joint.

For use between flanges having opposed bolt holes, the binder gasket is cast with an integral lateral enlargement 8, outwardly of the gasket-forming portion 6, this enlargement being preferably formed with a plurality of bolt-receiving holes, and being of a thickness a trifle less than that of the binder gasket 6. It is a feature of this invention that each bolt-receiving hole in the enlargement 9 is of larger dimensions than requisite for mere passage of the bolt, and in one preferred form comprises a plurality of edge recesses 10 in any of which each bolt may be partially received.

The enlargement may be formed with any desired number of these bolt-receiving holes, and as shown they are quarteringly disposed at corner portions of the enlargement around the binder gasket, each bolt hole in the form shown in Figs. 1 and 3, having three edge recesses 10. This construction

and arrangement of the bolt-receiving holes permits any one given size of the vaporizer to be shifted into position between various sizes, and to be installed between various styles, of pipe flanges which are provided with the usual flange coupling bolt holes and bolts, the latter holding my vaporizer fixedly in proper working position. In practice the form of enlargement 8 is adapted, by the universal adjustment provided for by the bolt-receiving holes shaped and arranged as shown, for ready location in a considerable number of different sizes or styles of pipe flanges now in common use in motor cars on pipes connecting carbureters and manifolds. The enlargement 8 may be made of various other sizes and dimensions and with any desired form of bolt holes variously disposed to suit different styles or shapes of pipe flanges preformed with bolt holes variously positioned. The enlargement in any event is preferably thinner than the binder basket so that tight joints may be formed with certainty between opposed surfaces of the binder gasket, and of the pipe flanges. It frequently happens that the pipe flanges referred to are found not to be parallel when it is desired to install my vaporizer, and by making the enlargement thinner than the gasket binder, it is practical to bring the inner margins of the pipe flanges into tight-joint-forming relation to the binder gaskets when the flange-holding bolts are tightened up, and tight joints are essential here for prevention of gas leakage. The inner margin 11 of the united screen margins 2 and 3, between the inner edge of the binder gasket and the outer wall of the outer screen, that is between the united margins and the concavo-convex portion of the screen, are preferably left uncovered and unobstructed by the binder gasket and in an open-mesh condition so that the screen structure may as far as possible permit the passage therethrough of gaseous vapor. The diameter of the concavo-convex portion of the assembled screens is preferably made less in some sizes and for some uses, than the interior diameter of the gasket binder so that the upwardly projecting concavo-convex portions of the screens may not, by contact with the inner wall of the pipe into which the screen projects, interfere with lateral adjustments of the vaporizer.

The outer diameter of the tubular troughed spacer above referred to is very much less than the diameter of the concavo-convex portions of the screens. In operation the gas flows not only through the tubular spacer, but also around and past it within the screen chamber, and through the screens within the inner circumference of the gasket binder. Thus so much of the vaporizer structure as comes within connecting gas conduits constitutes a minimum obstruction to the continuous and requisite flow of gas. To prevent back-firing into the carbureter two screens spaced apart are found best, and the domed or concavo-convex shape is desirable when the vaporizer is to be installed adjacent a butterfly valve in order that the vaporizer may not interfere with the valve movements.

The tubular troughed spacer referred to functions not only as a permanent and non-disintegrating spacer, but also in a peculiar and important manner as follows: The upper end of the shank 12 tapers upwardly and inwardly and at its lower end, adjacent the apex of the inner screen, is formed with a marginal trough 13 formed by turning the bottom margin of the tube inwardly and upwardly into the chamber of the shank. The inner diameter of the annular trough is less than the inner diameter of the shank which is open at each end. Thus the spacer forms a minimum obstruction to the flow of gas, some of the gas passing through the bore of the spacer, and some outside of it, and some of the gas in its flow to the manifold or engine striking against the inner wall of the contracted upper end of the spacer, there condensing and flowing into the trough 13 as a container, so that when the engine is at rest there is some condensed gas or vaporizable liquid fuel in the trough and vaporizing therefrom to form a supplementary gas supply for facilitating the starting of the engine. The spacer has a slight jetting effect which is calculated to improve the mixture, and the screens themselves promote mixing after the gas leaves the carbureter.

It is important in all cases that no material used to space the screens apart or to hold a gas supply or to bind the screens together should be of a nature to disintegrate in use and thereby clog the screens and interfere with operation, and this requirement is especially important in vaporizers of the present class when they are to be used in flying machine engines.

It is found in actual practice that the vaporizers must be not only tight-jointedly confined in place between pipe flanges, but also that the margins of the wire screens must be very strongly bound together to withstand the force of back-firing, and that the screens be separated by indestructible spacers that offer a minimum obstruction to the gas flow from carbureter to the manifold. By casting the lead or other soft gasket-forming metal on the margins and edges of the screen margins, the metal flows into the interspaces or pits of the wire margins and interlocks with them, and the apices of the soft metal (preferably lead) ribs of the corrugations 7 crush down under bolt and flange pressure and conform to and fill irregularities in the therewith contacting

surfaces of the pipe flanges, making a gas-tight joint.

What I claim is,—

As a new article of manufacture, a device of the class stated, comprising a pair of opposed wire mesh screens; a gasket of soft metal interlocking with opposed margins of the screens; and a separable, upstanding open-ended metal spacer fixedly positioned between the opposed central portions of the screens; such spacer having a contracted upper end and an imperforate trough at its lower end.

In testimony whereof I have hereunto set my hand this 5th day of October, 1916.

FREDERICK M. WILLIS.