Dec. 25, 1928. 1,696,475

H. L. ELLIOTT ET AL

INTERNAL COMBUSTION ENGINE

Filed Dec. 22, 1926

Fig. 1

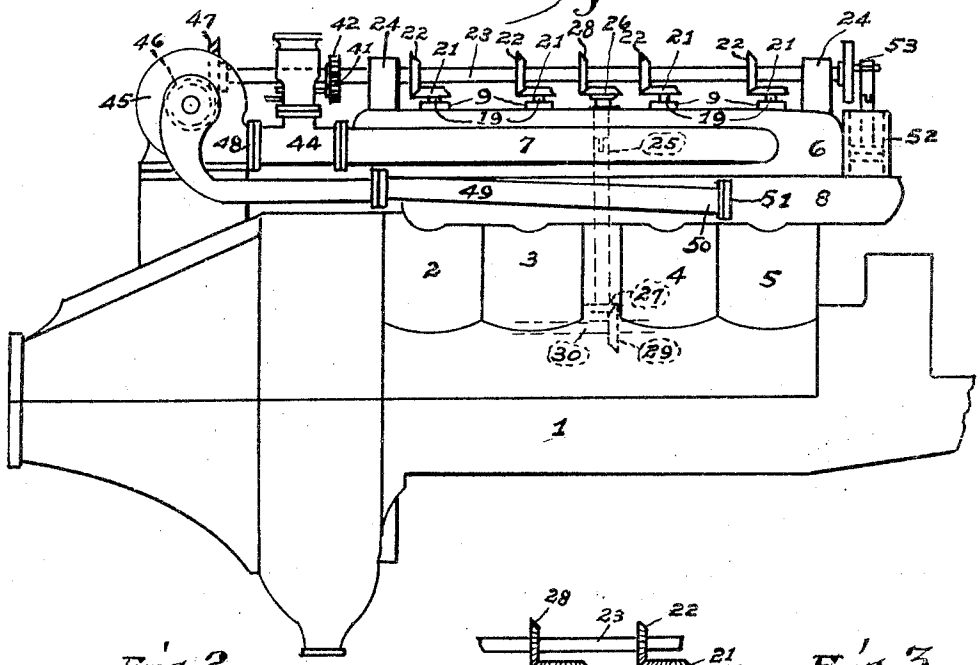


Fig. 2

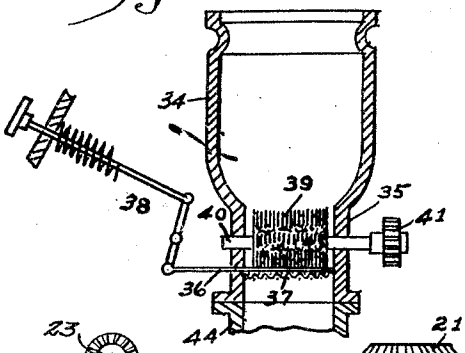
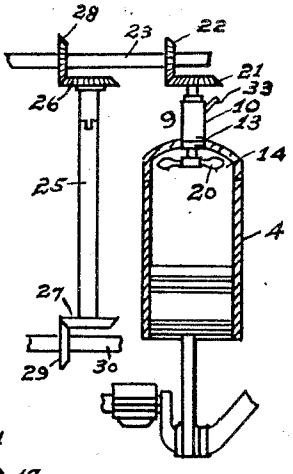


Fig. 3



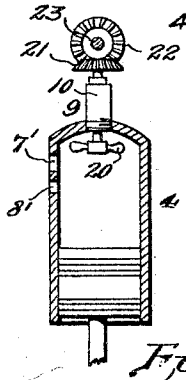


Fig. 6.

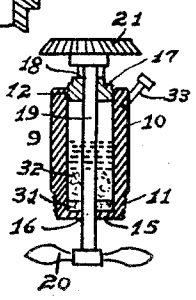


Fig. 4

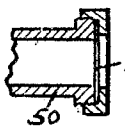


Fig 5

INVENTORS
Henry L. Elliott
Robert A. Carroll
BY Jas. P. Snyder
ATTORNEY

Patented Dec. 25, 1928. 1,696,475

UNITED STATES PATENT OFFICE.

HENRY L. ELLIOTT AND ROBERT A. CARROLL, OF CLAYSVILLE, PENNSYLVANIA.

INTERNAL-COMBUSTION ENGINE.

Application filed December 22, 1926. Serial No. 156,381.

This invention relates to certain improvements in internal combustion engines, and important objects of the invention are to provide an engine of the type stated which will function on a fuel consisting of a volatile dust compound or mixture susceptible of explosive reaction, which will also operate with great efficiency on the usual gas or gasoline fuel mixtures; and which embodies novel means for carbureting the dust fuel and for more completely clearing the engine cylinders from products of combustion.

Further objects of the invention are to provide an engine of the character described which is simple in its construction and arrangement, efficient and economical in its operation, and comparatively inexpensive to manufacture.

With the foregoing and other objects in view which will appear as the description proceeds, the invention resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed, it being understood that changes in the precise embodiment of the invention hereinafter disclosed can be made within the scope of what is claimed without departing from the spirit of the invention.

In the drawing wherein like numerals of reference designate corresponding parts throughout the several views:—

Figure 1 is a side elevational view of an internal combustion engine constructed in accordance with the invention.

Figure 2 is an enlarged vertical sectional view of a portion of the carbureting element.

Figure 3 is a vertical sectional view of one of the engine cylinders with associated parts.

Figure 4 is an enlarged detail view of the fuel charge animator, partly in cross section.

Figure 5 is an enlarged sectional view of the dehydrating air inlet.

Figure 6 is a vertical sectional view of one of the engine cylinders with associated parts.

Referring in detail to the drawing 1 denotes an internal combustion engine which, with the exception of the features thereof embodying the invention, conforms to the conventional type of engine structure commonly employed in the construction of motor vehicles.

The engine 1 comprises a plurality of integrally connected cylinders, respectively indicated at 2, 3, 4 and 5, which are covered by the usual cylinder head 6. The engine 1 further includes the fuel intake manifold 7 and the exhaust manifold 8. The fuel intake manifold 7 communicates with the cylinders 4 through respective ports 7′, and the exhaust manifold 8 communicates with the cylinders 4 through respective ports 8′.

A fuel charge animator 9 is associated with each of the engine cylinders 2, 3, 4 and 5. Each of the animators 9 consists of cylindrical casing 10 having an externally threaded lower end 11 and an internally threaded upper end 12. The casing 10 is secured in the vertical position by having its threaded lower end 11 engaged in a threaded aperture 13 which is formed in the cylinder head 6 and which communicates with the combustion chamber 14. The casing 10 is provided with a bottom 15 formed with a centrally disposed bearing aperture 16, and with a screw cover 17, likewise formed with a centrally disposed bearing aperture 18 and engaging the internally threaded upper end 12.

An annular shaft 19 extends vertically through the casing 10 and is suitably journaled for rotation in the aligned bearing apertures 16 and 18. The lower end of the shaft 19 extends into the combustion chamber 14 and carries a horizontally disposed fixed fan 20, which is positioned in the combustion chamber 14 and rotatable therein at all times during the operation of the engine.

The upper end of each of the animator shafts 19 projects above respective casings 10 and is provided with a fixed bevel gear 21, which meshes with an associated bevel gear 22 fixed on a common drive shaft 23. The latter is disposed horizontally along the top of the cylinder head 6 and is suitably journaled for rotation, as indicated at 24. The drive shaft 23 is driven by a vertically disposed, suitably journaled and jointed shaft 25, provided with a fixed bevel gear 26 at its upper end and with a fixed bevel gear 27 at its lower end. The gear 26 is in mesh with a bevel gear 28 which is fixed on the drive shaft 23, and the gear 27 is in mesh with an associated bevel gear 29 fixed on the usual cam shaft 30 of the engine 1. By this arrangement of the driving gearing the rotation of the drive shaft 23 will impart simultaneously, a continuous rotary movement to the fan 20 in each of the combustion cham-

bers 2, 3, 4 and 5 during the operation of the engine.

Asbestos heat insulators 31 are arranged on the casing bottom 15 around the animator shafts 19, and the latter are lubricated by graphite 32, or any other suitable lubricant. Each of the casings 10 is provided with a grease tube 33 for permitting of and facilitating the injection of the lubricant into the casing 10.

The purpose of the animators 9 is to maintain the dust fuel charge, in the combustion chambers of the cylinders, in continual motion to prevent particles of the charge from lodging on, and permanently adhering to the walls of the combustion chambers. Further, the action of the fans 20 in the combustion chambers serves to equalize the distribution of the fuel charge and aid in the expulsion of the products of combustion from the combustion chambers.

The carbureting element used in connection with our improved engine, comprises an auxiliary fuel storage cup 34 provided with a depending outlet neck 35. The fuel storage cup 34 is adapted to be connected in communication with the main fuel supply tank (not shown) and supplied from the latter by gravity or in any other suitable manner.

A fuel control gate valve 36 is mounted in the lower end of the cup neck 35 and comprises a thin flat horizontally disposed plate sidably shiftable to cover or uncover the parallel disposed fuel screen 37 fixed in the cup neck 35 directly below the control valve 36. The adjustment of the valve 36 relatively to its position with the screen 37 will regulate the fuel supply to the engine. In a motor vehicle engine the operation of the valve 36 would be controlled from the driver's seat in the usual manner, and the valve 36 would return to and remain in the closed position by the spring action of the operating elements 38, as shown in Figure 2.

A fuel agitator brush 39 is positioned in the cup neck 35 directly above the valve 36, and is fixed to a horizontally disposed shaft 40 which is suitably journaled for rotation in the cup neck 35. The projecting end of the brush shaft 40 carries a fixed gear 41 which is in mesh with an associated gear 42 on the animator drive shaft 23. The rotation of the brush 39 will at all times, clean-ly sweep the valve 36 and that portion of the screen 37 exposed by the adjustment of the valve 36. The action of the brush 39 will prevent the screen 37 from clogging and at the same time agitate the fuel dust to insure a continuous, regular flow of dust fuel from the storage cup 34 through the valve 36 and screen 37.

A fuel intake tube 44 connects the cup neck 35 with the intake manifold 7. An air blower 45 is suitably fixed to the engine 1 and is driven by a bevel gear 46 which is in mesh with the bevel gear 47 fixed on the animator drive shaft 23. A union 48 communicably connects the blower 45 with the fuel intake tube 44. An air intake tube 49 is connected with the blower 45 and the air inlet end 50 thereof is covered with an air dehydrating member 51. The latter may constitute of a plurality of plies of textile fabric, as shown, or any other suitable air dehydrating agent. The dehydrating member 51 is positioned in close proximity to exhaust manifold 8, or in any suitable position to maintain the same constantly heated for the purpose of eliminating all moisture from the air on its passage through the dehydrating member 51 and before it is blown into the dust fuel mixture.

It will be noted that in the carbureting element herein described the air blower 45 will act in conjunction with the usual suction induced by the engine pistons for driving and drawing the dust fuel mixture into the combustion chambers.

For more efficiently removing the products of combustion from the engine cylinders, a suction pump 52 is provided which communicates with the exhaust manifold 8, and which is driven by a suitable driving connection 53 with the animator drive shaft 23. The operation of the pump 52 acts in connection with the usual exhaust stroke of the pistons for completely removing all of the products of combustion, even that which ordinarily remains in the combustion chambers 14 when expelled by the usual piston stroke only.

While the use of the animators 9, as herein described, is primarily intended for use in connection with an internal combustion engine using a dust fuel, the same may also be successfully employed, for increasing the efficiency of an internal combustion engine using gas and gasoline, or any heavy hydrocarbon liquid fuel.

From the foregoing description taken in connection with the accompanying drawing, the principle of construction and the method of operation will be readily apparent to those skilled in the art to which the invention appertains, and while describing a certain embodiment of the invention, it is to be understood that the device shown in the drawing is merely illustrative, and that various changes in the form, proportions and minor details of construction may be resorted to, without departing from the principle or sacrificing any advantages of the invention which come within the scope of the claims hereunto appended.

What we claim is:

1. In an internal combustion engine using a dust fuel mixture, means for animating the dust fuel charge in the combustion chamber of the engine, means for carburet-

ing the dust fuel charge, and auxiliary means for exhausting the products of combustion.

2. In an internal combustion engine using a dust fuel mixture, a dust fuel animator rotatably mounted in the combustion chamber of the engine, means for operating said animator, a dust fuel carbureter, said carbureter including air supply means provided with an air dehydrating element.

3. In an internal combustion engine using a dust fuel mixture, a dust fuel animator rotatably mounted in the combustion chamber of the engine, means for operating said animator, a dust fuel carbureter, said carbureter including air supply means provided with an air dehydrating element, and auxiliary means for exhausting the products of combustion.

4. In an internal combustion engine using a dust fuel mixture, a dust fuel animator rotatably mounted in the combustion chamber of the engine, means for operating said animator, a dust fuel carbureter, said carbureter including an air blower having an air supply member provided with an air dehydrating element, and a suction pump for completely exhausting the products of combustion from the combustion chamber of the engine.

5. In an internal combustion engine of the multi-cylinder type using a dust fuel mixture, a dust fuel animator rotatably mounted in the combustion chamber in each of the engine cylinders, means driven by its connection with the engine for simultaneously operating said fuel animators, a dust fuel carbureter including an air blower having an air supply member provided with an air dehydrating element, and auxiliary means for removing the products of combustion from the combustion chambers.

In testimony whereof we affix our signatures.

HENRY L. ELLIOTT.
ROBERT A. CARROLL.