in this face and engage slots 376 in the mounting flanges 367 so that the height of the solenoid above valve 310 can be adjusted. The two terminals 377 are connected into the electrical circuit by wires (not shown) which may be extended into unit 38 via the air filter assembly.

When solenoid 56 is energized its magnetized core attracts valve stem 328 and valve member 326 is lifted until stem 328 abuts the lower flange 372 of the solenoid core. Thus valve 310 is opened when the ignition switch is closed and will close under the influence of spring 327 when the ignition switch is opened. Vertical adjustment of the solenoid position controls the lift of valve member 326 and therefore the maximum fuel flow rate through unit 38.

Electrolyte cell 41 produces hydrogen in the ratio 2:1 to provide a mixture which is by itself completely combustible. However, as used in connection with existing internal combustion engines the volume of hydrogen and oxygen required for normal operation is less than that of a normal fuel air mixture. Thus a direct application to such an engine of only hydrogen and oxygen in the amount required to meet power demands will result in a vacuum condition within the system. In order to overcome this vacuum condition provision is made to draw make-up air into throats 319 via the air filter assembly 302 and upper body portion 301.

Upper body portion 301 has a single interior passage 328 through which make-up air is delivered to the dual throats 319. It is fastened to body portion 303 by clamping studs 329 and a gasket 331 is sandwiched between the two body portions. The amount of make-up air admitted is controlled by an air valve flap 332 disposed across passage 328 and rotatably mounted on a shaft 333 to which it is attached by screws 334. The valve flap is notched to fit around solenoid casing 366. Shaft 333 extends through the wall of body portion 301 and outside that wall it is fitted with a bracket 335 which carries an adjustable setting screw 336 and a biasing spring 337. Spring 337 provides a rotational bias on shaft 333 and during normal running of the engine it simply holds flap 332 in a position determined by engagement of setting screw 336 with a flange 338 of body portion 301. This position is one in which the flap almost completely closes passage 328 to allow only a small amount of make-up air to enter, this small amount being adjustable by appropriate setting of screw 336. Screw 336 is fitted with a spring 339 so that it will hold its setting.

Although flaps 332 normally serve only to adjust the amount of make-up air admitted to unit 38, it also serves as a pressure relief valve if excessive pressures are built up, either due to excessive generation of hydrogen and oxygen gases or due to buring of gases in the inlet manifold of the engine. In either event the gas pressure applied to flaps 332 will cause it to rotate so as to open passage 328 and allow gases to escape back through the air filter. It will be seen in FIG. 32 that flap mounting shaft 333 is offset from the centre of passage 328 such that internal pressure will tend to open the flap and thus exactly the reverse of the air valve in a conventional gasoline carburetor.

Air filter assembly 302 comprises an annular bottom pan 341 which fits snugly onto the top of upper body portion 301 and domed filter element 342 held between an inner frame 343 and an outer steel mesh covering 344. The assembly is held in position by a wire and eyebolt fitting 345 and clamping nut 346.

Body portion 305 of unit 38 (FIG. 31), which is fastened to body portion 303 by clamping studs 347, carries throttle valve apparatus to control engine speed. It has two vertical bores 348, 349 serving as continuations of the dual throats which started in body portion 303 and these are fitted with throttle valve flaps 351, 352 fixed to a common throttle valve shaft 353 by fixing screws 354. Both ends of shaft 353 are extended through the wall of body portion 305 to project outwardly therefrom. One end of this shaft is fitted with a a bracket 355 via which it is connected as in a conventional carburetor to a throttle cable 356 and also to an automatic transmission kick-down control linkage 357. A biasing spring 358 acts on shaft 353 to bias throttle flaps toward closed positions as determined by engagement of a setting screw 359 carried by bracket 355 with a plate 361 projecting from body portion 303.

The other end of throttle valve shaft 353 carries a lever 362 the outer end of which is connected to a wire link 407 by means of which a control connection is made to the valve stem 314 of valve member 311 via a further lever 406 connected to the outer end of the valve stem. This control connection is such that valve member 311 is at all times positioned to pass a quantity of gas mixture appropriate to the engine speed as determined by the throttle setting. The initial setting of valve member 311 can be adjusted by selection between two connection holes 405 in lever 406 and by bending of link 407.

Body portion 303 is fastened to the bottom body portion 300 of unit 38 by four clamping studs 306. The bottom body portion has two holes 364, 365 which form continuations of the dual throats and which diverge in the downward direction so as to direct the hydrogen, oxygen and air mixture delivered through these throats outwardly toward the two banks of cylinder inlets. Since this fuel is dry, a small quantity of oil vapour is added to it via a passage 403 in body portion 305 to provide some upper cylinder lubrication. Passage 403 receives oil vapour through a tube 404 connected to a tapping on the engine tapped cover. It discharges the oil vapour downwardly onto a relieved top face part 368 of body portion 300 between holes 364, 365. The vapour impinges on the relieved face part and is deflected into the two holes to be drawn with the gases into the engine.

In the illustrated gas mixing and delivery unit 38, it will be seen that passageway 309, vertical passageway 316, chamber 324 and nozzles 318 constitute transfer passage means via which the hydrogen mixture pass to the gas flow duct means comprised of the dual throats via which it passes to the engine. The transfer passage means has a gas metering valve comprised of the valve member 311 and the solenoid operated valve is disposed in the transfer passage means between the metering valve and the gas flow duct means. The gas metering valve is set to give maximum flow rate through the transfer passage means at full throttle setting of throttle flaps 351, 352. The solenoid operated valve acts as an on/off valve so that when the ignition switch is opened the supply of gas to the engine is positively cut-off thereby preventing any possibility of spontaneous combustion in the cylinders causing the engine to "run on". It also acts to trap gas in the electrolytic cell and within the mixing chamber of the mixing and delivery unit so that gas will be available immediately on restarting the engine.