

which also comprises a valve plate portion 242 biased against the upper end of the bushing by compression spring 243. Valve member 240 is lifted against the action of spring 243 by the pressure of hydrogen gas within passage 221 to allow the gas to pass into the interior of valve head 237 and then out through ports 220 in that member into reservoir 225.

Hydrogen is withdrawn from reservoir 225 via a stainless steel crooked tube 241 which connects with a passage 409. Passage 409 extends to a port 250 which extends downwardly through the top and bottom closure plates 178, 179 and top insulator 182 into a hydrogen duct 244 extending vertically within the casing of 171. Duct 244 is of triangular cross-section. As will be explained below, the hydrogen passes from this duct into a mixing chamber defined in the gas mixing and delivery unit 38 which is bolted to casing 171.

Oxygen is withdrawn from chamber 195 via the inner annular passage 221 in the top closure. Passage 221 is not circular but has a scalloped configuration to extend around the water inlet. Oxygen enters it through eight ports 245 extended through top closure plate 179 and the annular flange portion of upper insulator 182. The oxygen flows upwardly from passage 222 through a one-way valve 246 and into a reservoir 260 provided by a plastic housing 247. The arrangement is similar to that for withdrawal of hydrogen and will not be described in great detail. Suffice to say that the bottom of the chamber is charged with water and the oxygen is withdrawn through a crooked tube 248, an outlet passage 249 in top closure plate 178, and a port which extends downwardly through closure plates 178, 179 and top insulator 182 into a triangular cross-section oxygen duct 251 extending vertically within casing 171 disposed opposite hydrogen duct 244. The oxygen is also delivered to the gas mixing chamber of the mixing and delivery unit 38.

The pressure sensing tube 63 for switch 62 is connected via a tapered thread connector 410 and a passage 411 in the top closure plate 178 directly to the annular hydrogen passage 222. If the pressure within the passage rises above a predetermined level, switch 62 is operated to disconnect capacitor C2 from the common negative line 54. This removes the negative signal from capacitor C2 which is necessary to maintain continuous operation of the pulse generating circuitry for generating the triggering pulses on thyristor T1 and these triggering pulses therefore cease. The transformer TR1 continues to remain in operation to charge dumping capacitor C5 but because thyristor T1 cannot be triggered dumping capacitor C5 will simply remain charged until the hydrogen pressure in passage 222, and therefore in chamber 195 falls below the predetermined level and triggering pulses are applied once more to thyristor T1. Pressure actuated switch 62 thus controls the rate of gas production according to the rate at which it is withdrawn. The stiffness of the control springs for gas escape valves 224, 246 must of course be chosen to allow escape of the hydrogen and oxygen in the proportions in which they are produced by electrolysis, i.e. in the ratios 2:1 by volume.

Reservoirs 225, 260 are provided as a safety precaution. If a sudden back-pressure were developed in the delivery pipes this could only shatter the plastic housings 226, 247 and could not be transmitted back into the electrolytic cell. Switch 62 would then operate to stop further generation of gases within the cell.

The electrical connections of secondary transformer coil 89 to the anode and the cathode are shown in FIG. 14. One end of coil 89 is extended as a wire 252 which extends into a blind hole in the inner face of the anode where it is gripped by a grub screw 253 screwed into a threaded hole extended vertically into the anode underneath collar 200. A tapered nylon plug 254 is fitted above screw 253 to seal against loss of oil from the interior of the anode. The other end of coil 89 is extended as a wire 255 to pass downwardly through a brass bush 256 in the bottom insulator 183 and then horizontally to leave casing 171 between bottom insulating disc 176 and insulator 183.

As most clearly shown in FIG. 23, brass bush 256 has a head flange 257 and is fitted at its lower end with a nut 258 whereby it is firmly clamped in position. Gaskets 259, 261 are disposed beneath head flange 257 and above nut 258 respectively.

At the location where wire 255 is extended horizontally to leave the casing the upper face of disc 176 and the lower face of insulator 183 are grooved to receive and clamp onto the wire. Disc 176 and insulator 183 are also extended radially outwardly at this location to form tabs which extend out beneath casing 171 and ensure proper insulation of the wire through to the outer periphery of the casing.

Outside the casing, wire 255 is connected to a cathode terminal bolt 262. Terminal bolt 262 has a head which is received in a socket in separate head piece 263 shaped to suit the cylindrically curved inner periphery of the cathode and nickel plated to resist chemical attack by the electrolyte solution. The stem of the terminal bolt extends through openings in the cathode and peripheral wall portion 188 of insulator 183 and air insulating bush fitted in an aligned opening in the casing wall 172. The head piece 263 of the terminal bolt is drawn against the inner periphery of the cathode by tightening of a clamping nut 265 and the end of wire 255 has an eye which is clamped between nut 265 and a washer 266 by tightening a terminal end nut 267. A washer 268 is provided between nut 265 and brush 264 and a sealing O-ring 269 is fitted in an annular groove in the bolt stem to engage the inner periphery of the bush in order to prevent escape of electrolyte solution. The terminal connection is covered by a cover plate 271 held in place by fixing screws 272.

The two ends of the primary transformer coil 88 are connected to strip conductors 273, 274 which extend upwardly through the central portion of upper insulator 183. The upper ends of conductors 273, 274 project upwardly as pins within a socket 275 formed in the top of upper insulator 183. The top of socket 275 is closed by a cover 276 which is held by a centre stud 277 and through which wires 278, 279 from the external circuit are extended and connected to conductors 273, 274 by push-on connectors 281, 282.

The transformer connections shown in FIG. 14 are in accordance with the circuit of FIG. 2, i.e. the ends of secondary coil 89 are connected directly between the anode and the cathode. Transformer TR2 is a step-down transformer and, assuming an input of pulses of 22 amps at 300 volts and a coil ratio between the primary and secondary of 10:1 the output applied between the anode and the cathode will be pulses of 200 amps at a low voltage of the order of 3 volts. The voltage is well in excess of that required for electrolysis to proceed and the very high current achieved produces a high rate of yield of hydrogen and oxygen. The rapid