hole drilled in the occipital protuberance so that the lumen at its tip was in close apposition to the rostral edge of the atlanto-occipital membrane. The hub of the guide tube was then firmly fixed to the occipital protuberance with a small stainless steel anchoring screw (BA 10) and acrylic resin (Simplex, Dental Fillings Limited).

Two weeks postoperatively, ventricular perfusion experiments were performed with the rabbit fully conscious. A 25 gauge needle, 16 mm in length, was inserted percutaneously into one of the guide tubes to the lateral ventricles. A huber pointed 25 gauge needle, 32 mm in length, was inserted percutaneously into the guide tube to cisterna magna and advanced cautiously round the curve at the tip of the guide tube by gentle tapping. Following successful punctures of the ventricular system, the needles were connected either to a " closed " perfusion system with a volume of 0·3 ml. for recirculatory perfusion (Ashcroft, Dow & Moir, 1968a, b; Ashcroft, Crawford, Dow & Moir, 1969) or to an " open-ended " system.

Perfusions of the ventricular system have been performed with a balanced salt solution at a rate of 0·08 ml./min for up to 5 hr without the animals showing signs of distress.

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A smoking simulator for the controlled presentation of tobacco smoke to laboratory animals

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The smoking simulator illustrated in Fig. 1 allows the presentation of tobacco smoke to an experimental animal, in conditions similar to those described by Armitage, Hall & Morrison (1968). Smoke can be introduced into the lungs or mouth.

Smoke is introduced into the lungs of a cat, artificially ventilated with an oscillating pump (A). Air leaving port *a* passes across the face of port *z*, through tube G and tracheal cannula H to the lungs. Expired air is exhausted at port *b*. Cam B controls smoking pump C and cam D operates slide valve E. The presence or absence of a small plate, placed in one of two recesses cut in cam B, allows smoking to occur at 1 min or 30 sec intervals. In stage one of the smoking cycle, slide valve E is moved by cam D so that port *x* opens into chamber C. The piston in C operated by cam B sucks air through a lighted cigarette placed in port *x*, and 25 ml. smoke is drawn into chamber C. Slide valve E moves again so that port *y* opens into C (stage 2) and excess smoke is exhausted through F. Smoke retained (1 to 5 ml.) depends on a star wheel attached to cam B, controlling the exhaust stroke of piston in C. In stage three, slide valve E is moved so that port *z* opens into C, and the

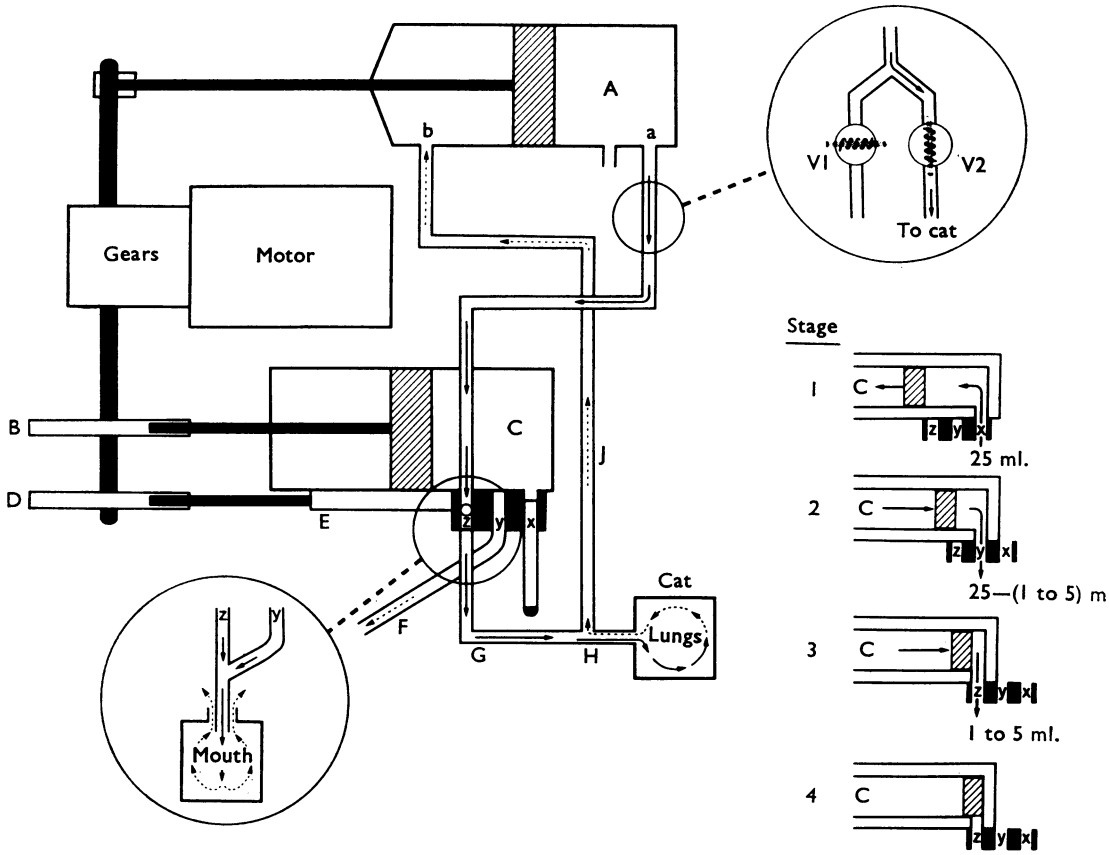

FIG. 1.

smoke sample is injected into the airstream from pump A, ensuring its immediate passage to the lungs. Between puffs, port *z* is shut off from C by the piston (stage 4).

By modification of connections between A and C, the simulator can be used to introduce smoke into the mouth of a spontaneously breathing cat. Pump A is used to blow all the 25 ml. of smoke from C into the mouth (solenoid valve V_2 open) by coupling outlet tubes from *z* and *y* as shown in lower inset. The smoke is then held in the mouth for 10 sec by closing V_2 and opening V_1. The position of these valves is then reversed to flush smoke from the mouth. The opening and closing of these valves is triggered from a third cam (not shown) on the same shaft as cams B and D.

This simulator might be useful for studying the toxicology and pharmacology of other aerosols (for example pesticides) or smoke from cannabis.

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