device to be defined which permitted calculation of critical dimensions. The range of pressure loads were set at −5 to −150 cm H_2O, with a range of inspiratory flow rates from 0 to −13 L s^{-1}.

A number of assumptions were made regarding the relationship between pressure and flow. All flow was assumed to be laminar. Furthermore, the relationship between pressure and flow for air passing through an orifice of given area was assumed to apply to noncircular inlets. In addition, the pressure/flow relationship through multiple inlets in parallel was assumed to be the same as that through a single inlet of identical area. All three assumptions are flawed, however, their violation has minimal functional significance in this context.

Results

The final design – a functional overview

It is neither realistic nor desirable to document the design process in its entirety. Thus, for the purpose of brevity, the final design will be described at this juncture. A functional overview follows, supplemented by a description of the major design processes. Figure 2 illustrates the finalised design.

The key subassemblies are as follows:

- mouthpiece – provides an interface between the user and the device;
- inspiratory valve – comprises a spring loaded poppet valve which opens only when a preselected threshold pressure is generated by the user;
- expiratory valve – comprises a one-way flap valve arrangement which permits unimpeded expiratory flow;
- tensioner knob – permits the inspiratory load to be altered (rotation of the tensioner knob either compresses or decompresses the spring element of the inspiratory valve arrangement);
- outer sleeve – acts to cover the tensioner knob arrangement during use and thus prevents manual opening of the inspiratory valve whilst also serving as a handle.

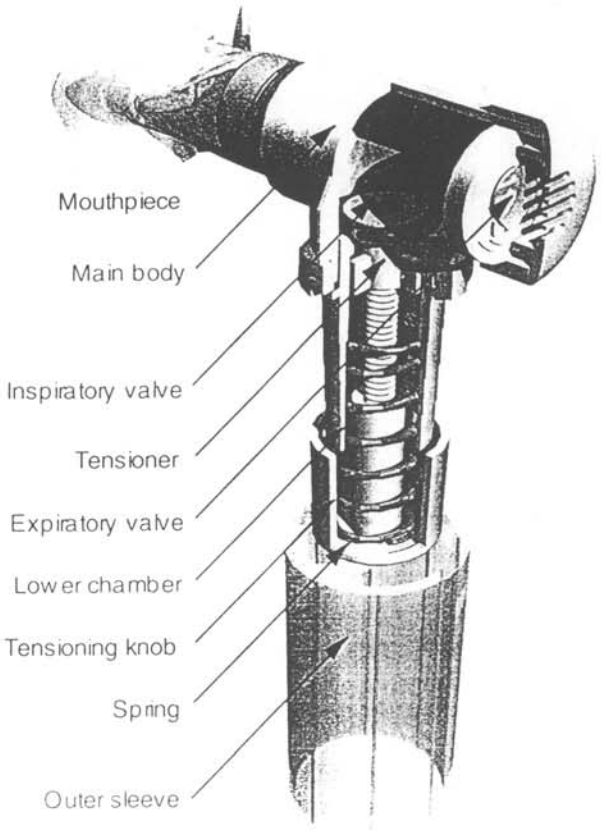

Figure 2 Cut-away illustration of the finalised pressure threshold training device

The main body constitutes the core of the device, it comprises three inlets, two in the vertical plane, a third in the horizontal, the orientation of these openings dictates the 'T-shaped' configuration of the device. The mouthpiece articulates with one of the vertical openings, the expiratory valve seat with the other. Both articulations are made via air-tight push fits.

A flap valve sits on the expiratory valve seat and is held in place by the expiratory valve cover. The flap is placed distally with regard to the mouthpiece and thus permits 'one-way' flow only. The horizontal opening on the underside of the main body articulates with the lower chamber. The main body and lower chamber connect via an L-shaped interference fit; compression of an