delivering a maximum pressure of 45 cm H_2O utilizing the pressure of hospital pipeline oxygen (55 to 60 psi). It is not necessary to have an oxygen cylinder as a pressure source.

An airway pressure of 45 cm H_2O is high and would rarely be used clinically. However, the results in figure 2 show that it is very unlikely that this pressure would be obtained in the lungs themselves. To obtain such a pressure, not only would all the side vents need to be sealed and the bronchoscope tip need to be a tight fit, but also the blow gun-inflating button would have to be fully depressed until the chest would expand no more.

Flow rates were adequate, as seen from the results in figure 4, and oxygen concentrations delivered were never less than 98 per cent. Flow control is progressive, however, and depends on the extent of depression of the button. Therefore, the button is depressed just enough to give the desired flow rate as judged by observation of chest expansion.

The clinical trials (table 2) showed that when the ventilator is set to deliver 45 cm H_2O maximum pressure, adequate ventilation, as shown by the CO_2 levels, is easily obtainable. Oxygen levels in all cases were above 250 mm Hg.

There were no complaints from the bronchoscopists during this trial period. In fact, the operators were impressed by both the clear field of vision and the freedom from misting of the telescope lenses due to the dry gas flow.

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A Method of Fixation of Nasotracheal Tubes in Infants

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Proper fixation of the nasotracheal tube is necessary for safe long-term mechanical ventilation of the infant or small child. There should be maximum mobility of the child with minimum risk of displacement of the airway. Additionally, the fixation apparatus should be readily available, simple, and lightweight, and should facilitate suctioning. A special nasotracheal tube described for this purpose has a crosspiece built into its proximal end.[1] Unfortunately the design of this special tube has introduced other difficulties. The length of the tube can be adjusted only by cutting the distal end. This is impossible after intubation. Additionally, we have often found it difficult to pass suction catheters through the crosspieces of very small tubes. For this reason we

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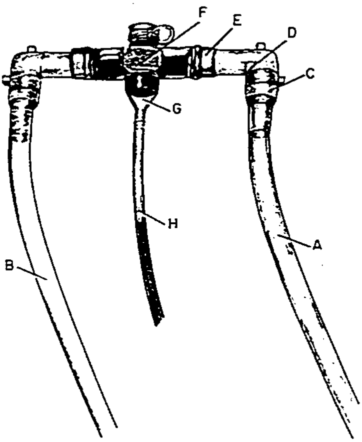

FIG. 1. Diagram of the apparatus. *A* and *B*, ventilator tubing; *C*, "tracheostomy adapter"; *D*, plastic elbow; *E*, ⅜" i.d. silicone rubber tubing; *F*, aluminum crosspiece with suction port; *G*, "tracheostomy adapter"; *H*, nasotracheal tube.

developed a device to properly fix a conventional nasotracheal tube.

The entire assembly (fig. 1) weighs 16 g. The nasotracheal tube is connected by a plastic "tracheostomy adapter" (Bennett No. 3501 through 3520, Puritan-Bennett Corp., Kansas City, Mo.) to an aluminum crosspiece with a suction port (Bourns No. 51399-00101, Bourns, Inc., Life Systems Division, Riverside, California). The arms of the crosspiece are connected to plastic elbows (Bennett No. 1025) by 3/8" i.d. silicone rubber tubing (Dow No. 601-541, Dow Corning Corp., Midland, Michigan). The elbows are connected through appropriate-sized plastic tracheostomy adapters to the inspiratory and expiratory tubing of the ventilator.

A head harness is made by wrapping 3- or 4-inch-wide elastic gauze bandage (Kling, Johnson and Johnson, Inc., New Brunswick, N. J.) around the head, passing it over the forehead and under the occiput, taking care to provide sufficint padding. The ventilator tubing is held by rubber bands passed around safety pins attached to the gauze harness (fig. 2). The nasotracheal tube is positioned to avoid pressure on the nasal ala by rotation of the crosspiece. A silk suture tied around the tube and held by a strip of adhesive tape

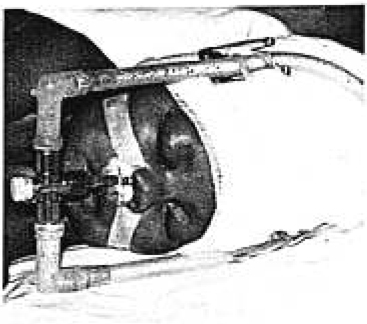

Fig. 2. An infant with a nasotracheal tube in place.

passed under the occiput aids in securing the tube. The suction port permits suctioning without disconnecting the infant from the ventilator, and the nasotracheal tube remains in proper position when the infant moves or is moved.

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A Safe Controlled Pop-off Valve

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Semiclosed circle systems are frequently used to administer inhalation anesthetic agents. With such systems, the excess gases must be allowed to escape through a "pop-off" valve.

Spring-loaded pop-off valves are often used for this purpose. However, such an arrangement has several disadvantages: 1) with manual assisted or controlled ventilation it is not possible to assess tidal exchange accurately, because an unknown portion of gas escapes from the circle through the pop-off valve; 2) frequent readjustment of the valve opening pressure is necessary to achieve the desired level of ventilation and to maintain adequate filling of the reservoir bag; 3) inadvertent setting of the valve at too high an opening pressure may result in positive pressure within the system throughout the respiratory cycle. This can lead to respiratory and circulatory embarrassment.

Devices such as the Georgia valve have been designed in an attempt to circumvent the drawbacks of the spring-loaded pop-off valves.[1] These valves still possess one undesirable feature, namely, that under certain con-

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