

## The Ambulatory Bird Ventilator

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The introduction by Avery<sup>1</sup> in 1956 of continuous mechanical ventilation as the primary treatment of crush injuries to the chest con-

tributed tremendously to reducing morbidity and mortality in this patient group. Prolonged continuous mechanical ventilation to reverse respiratory insufficiency is currently utilized until pulmonary function can be maintained within normal limits during spontaneous ventilation. Many patients in this group do not have injuries which prevent ambulation after the first few days of hospitalization. To fa-

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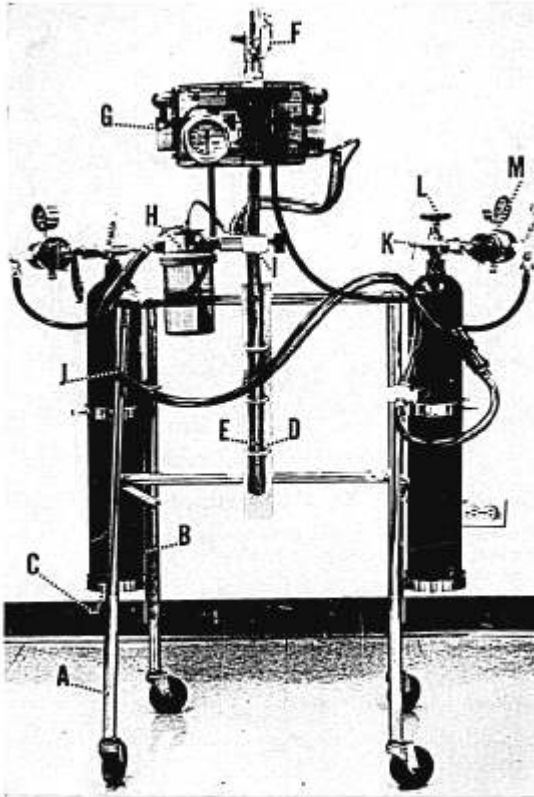


FIG. 1. Front view. A, steel walker (chrome-plated steel, Everett & Jennings, Rolling Aid 1893). B, bracket oxygen carrier. C, steel cross. D, steel deck plate, 16" x 2" x 3/8". E, 1 inch chrome-plated copper pipe. F, respirator bracket (Bird 999-370). G, Bird Mark 14 ventilator. H, 500-ml micronebulizer (Bird 9993-890). I, bracket kit. J, positive-phase breathing-head assembly (with an adult tracheostomy cross and plug, Bird 999-2425). K, yoke and adaptor with pin index (Bird 9993-068). L, aluminum wheel handle with rubber grip (Bird 999-1709). M, two-stage regulator with on/off lever (Bird 9993-014). N, duplex adaptor.

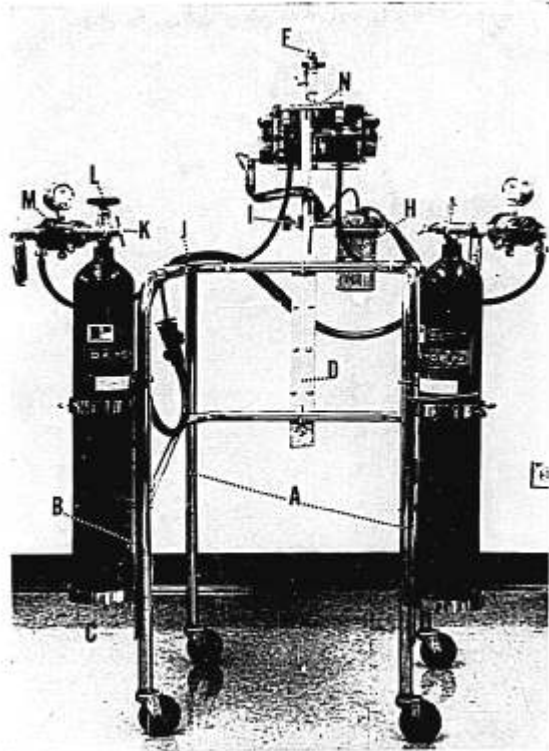


Fig. 2. Rear view.

ilitate walking, provide physical support and continue mechanical ventilation we have constructed an ambulatory Bird ventilator.

#### TECHNIQUE

The chassis (figs. 1 and 2) consists of a steel walker (A) with legs adjustable for height and with 3 inch wheels on casters. Affixed to each of the back vertical posts of the walker is a bracket (B) of steel designed to carry an E cylinder of oxygen. The lower portion of the bracket has a steel cross (C) to support the cylinder. The bracket is mounted by bolts and a "U" bolt. (The adjustable portion of the leg is not included in mounting.)

A steel desk plate  $16" \times 2" \times \frac{3}{8}"$  (D) is affixed to the front of the walker with "U" bolts on the upper and lower cross-bars. A 1 inch chrome-plated copper pipe with a slight "S" bend in the center (E) is attached to the steel plate with three "U" bolts. The slight "S" bend allows the ventilator to be mounted clear of the patient. Mounted on top of this 1 inch pipe is a respirator bracket (F). A Bird Mark 14 Ventilator (G) is suspended from the front of the respirator bracket. A 500-ml in-line long-term micronebulizer (H) is placed in circuit and suspended from the 1 inch pipe with a bracket kit (I). The circuit is a positive-

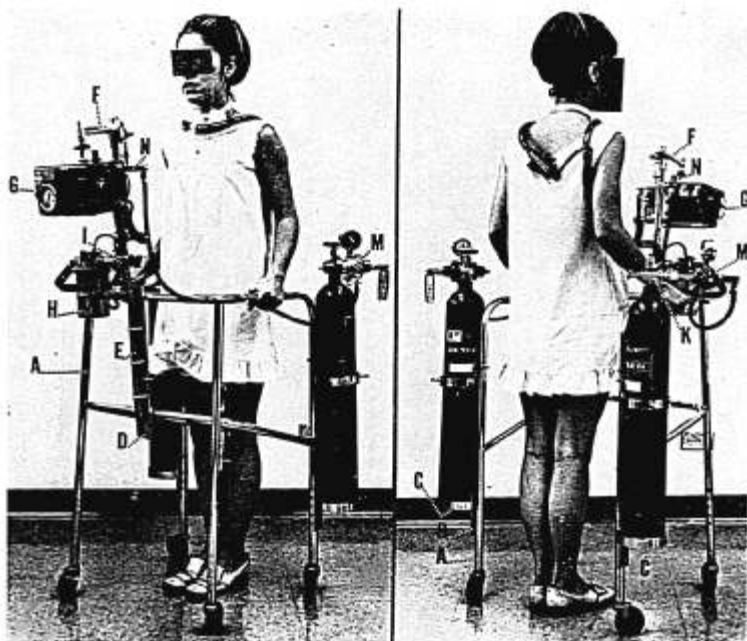


FIG. 3. Patient ventilated via tracheostomy. Rear view shows draping of breathing circuit.

phase breathing-head assembly (Bird) (J) with an adult tracheostomy cross and plug. Gas for respiratory exchange and ventilator drive is supplied from the oxygen tanks via yoke adaptors with a pin index fitting (K) and an aluminum wheel handle with a rubber grip (L) and two-stage regulators with an on/off handle (M). The gas at 50 psi is then piped through conductive flexible pressure tubing, clamped to the walker, to a duplex adaptor (N) attached to the back of the respirator bracket (F) and hence into the ventilator.

The breathing circuit is draped around the neck and back and under the right axilla of the patient. This provides maximum comfort. An E cylinder of oxygen provides mechanical

ventilation for 75 min with a tidal volume of 1,000 ml at a respiratory frequency of 12/min and with an inspiratory phase of 2 sec.

#### COMMENT

Our experience with the use of the ambulatory Bird ventilator has indicated a remarkable boost in patient and nursing morale and an accelerated improvement in the physical status of the patient.

#### REFERENCE

1. Avery EE, Morch ET, Benson DW: Critically crushed chests. A new method of treatment with continuous mechanical hyperventilation to produce alkalotic apnea and internal pneumatic stabilization. *J Thorac Cardiovasc Surg* 32:291, 1956