How to Get the Engström Respirator to Sigh
During Anesthesia

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The importance of periodic hyperinflation of the lungs during anesthesia has been stressed by many anesthesiologists. Bendixen and Laver recommended that passive hyperinflation to at least three times the average tidal volume be carried out every ten to 15 minutes. The ventilatory pattern of the Engström respirator favors an even distribution of gases in the lungs. This may, however, not be effective enough during prolonged anesthesia. Periodic sighs may also be advantageous even with this ventilator.

Figure 1 shows a simple device for sighing. The air-dosage valve (1) of the ventilator is connected with a two-liter respiration bag (2). The other end of the bag is connected by means of a T-piece (3) between the rotameter unit (4) and the inlet stop-cock (5) of the ventilator. A slow filling of the reservoir bag is accomplished by a mechanical resistor (6). The air-dosage valve of the ventilator is equipped with an adjustable set-stop (7) which can be adjusted to any volume indicated.

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Fig. 1. Simple sighing device for the Engström respirator.
on the scale. The pop-off valve of the water
trap (8) should be in the "Danger" position
(maximum tracheal pressure 70 cm./H2O).
When a sigh is desired the air dosage valve
is quickly turned to the volume indicated by
the set-stop (at least double the fresh gas
flow). During the expiratory cycle the res-
piration bag of the ventilator is thus filled
by a large volume of the anesthetic gas
mixture. The valve is then turned back to zero
position. If it is left open only two to three
sighs are possible before the reservoir bag is
emptied. Tracheal pressures double the nor-
mal can be created easily. If higher pres-
sures are desirable the pressure regulator of
the ventilator (9) must be turned to higher
readings.

REFERENCES
2. Engström, C. G.: The clinical application
   of prolonged controlled ventilation, Acta Anaesth.

Thermal Burns Caused by Warming Blankets
in the Operating Room

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Two cases are presented to direct attention
to circumstances in which thermal burns can
occur with use of warming blankets which are
not defective and which are operating within
"safe" temperature limits.

CASE 1

A 63-year-old white man weighing 187 pounds
was admitted with the diagnosis of bilateral iliac
artery occlusion, arteriosclerotic heart disease, and
diabetes mellitus. A warming blanket was placed
on the operating room table, under the patient's
hips and lower back, because of the anticipated
prolonged surgical time. This blanket was cov-
ered by a double layer of drape sheet and the
blanket's temperature regulator was set at 100° F.
The patient underwent an aorto-bifemoral bypass
with dacron graft placement and uneventful gen-
eral anesthesia. The total time for the procedure
was six hours and 15 minutes. After several hours
in the recovery area, the patient was returned to
the operating room for further surgery. This pro-
cedure required an additional hour and 45 min-
utes. The postoperative course was then uncom-
plicated until the second postoperative day when
the patient began to complain of severe discom-
fort in the sacral area. On examination he was
found to have an area of burn over the sacrum
estimated to be 40 per cent third-degree, 60 per
cent second-degree, with strips of second degree
burn extending over the buttocks. The area of
burn corresponded to the location of the warming
blanket used during surgery and the pattern of
burn to the fluid channels in the coils of the warm-
ing blanket (fig. 1).

CASE 2

A 67-year-old white woman weighing about 150
pounds was admitted with gangrene of the right
great toe and diabetes mellitus. After attempts
to control the diabetes, she underwent an aorto-
bifemoral bypass graft under general anesthesia.
A warming blanket covered by a sheet was placed
under the patient's shoulders and midback. The
total operating time was seven hours and 15 min-
utes. On the second postoperative day the pa-
tient complained of "soreness" over her upper
back. Examination revealed several areas of
second-degree burn in a symmetrical pattern over
the midthoracic area. Linear areas of erythema
extended along the back and corresponded in
spreading to the fluid channels in the warming
blanket.

DISCUSSION

In both cases the most severe injury oc-
curred in areas of greatest pressure, namely,
over bony prominences. Both patients were
diabetic, moderately obese, and had some
degree of vascular insufficiency. Preparative
solutions used for skin cleansing may have
predisposed to this injury. The pattern of
burn in each case corresponded exactly to the