

OIL MIST PRECIPITATOR

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ABSTRACT

A simple, inexpensive electrostatic precipitator has been built and used to eliminate oil mist in vacuum pump exhaust.

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The exhaust of a large vacuum pumping system on a polarized target cryostat at SLAC is 1 to 15 liter/sec of helium gas heavily contaminated with pump oil mist. This oil must be removed if we wish to use an available recovery system for this nonrenewable resource. I have found that electrostatic precipitation, which works so well on particulates, is also effective on oil mist, and a simple device based on this has been made.

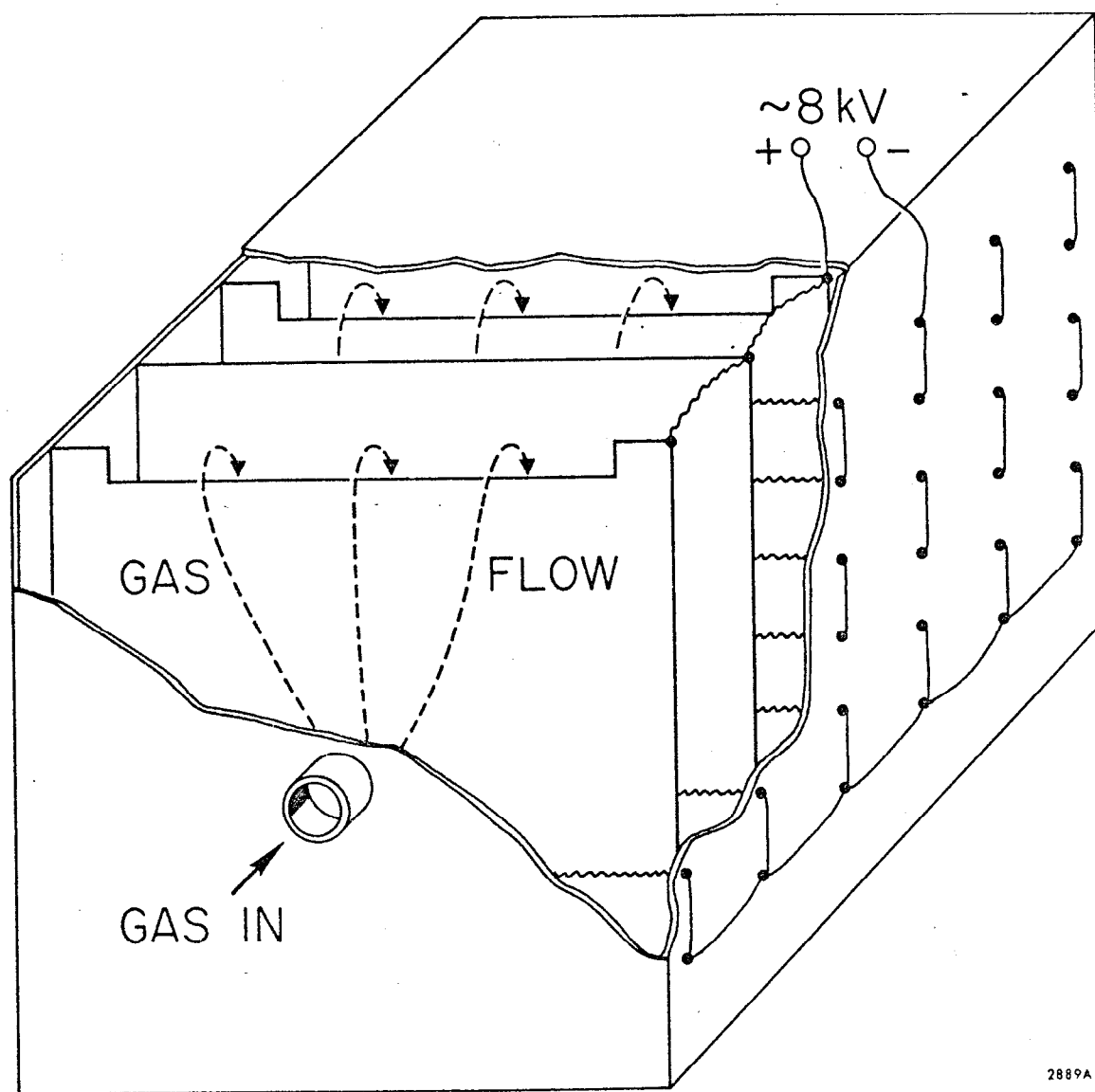
Five thin, stamped aluminum plates, 50 cm \times 50 cm, are placed in a lucite box at 8 cm spacing with \sim .1 mm wire strung in between (Fig. 1). The area presented to the gas flow, 8 cm \times 40 cm, is chosen to keep the flow laminar. A voltage of about 8 kV is appropriate, depending on wire diameter and gas flow. Operation is more stable over the range of flows if the current is limited by a \sim 3 megohm resistance. Some care in connecting and arranging wires is required to prevent arcing. Accumulated oil coats the plates, drips down, and is drained daily without interrupting operation. During 2 months of operation, more than 1 liter of pump oil was removed and no downstream contamination problem arose in the helium recovery system.

There are likely several situations in which this technique is appropriate in cleaning compressor and vacuum pump exhaust.

I would like to thank Doug Palmer for his assistance in assembling and testing the final device.

FIGURE CAPTION

1. The outside dimensions of the precipitator are roughly 50 cm on a side. The rectangular cutout at the top or bottom of sequential plates gives the efficient flow pattern indicated. Gas exits from the back.



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Fig. 1