recently are there on the market typewriter cleaners branded by obscure trade names but bearing in fine print on the label the reassuring note, "contains methyl chloroform."

Other commonly known substitutions that have protected an unknown number of plant people from occupational disease are use of artificial abrasives like silicon carbide (Carborundum) or aluminum oxide (Aloxite) for natural sandstone; use of steel grit, glass beads and other harmless materials instead of sand in abrasive blasting units; the change from lead as a paint pigment to harmless titanium dioxide, zinc chromate, iron oxide, and other such compounds.

While protection for the employee from harmful materials can usually be provided in some way or other, we're far better off to get rid of the harmful material itself. Then, if a breakdown in the control system (such as the exhaust) or an unexpected change in the operation occurs, people in the area will not be endangered. Both safety director and plant nurse should know what materials are used in the plant, how dangerous they are, and should always keep in mind the happy possibility of substituting a less dangerous substance. To gain this knowledge, as well as to keep in touch with their people, not only the safety engineer but the nurse also should make frequent plant tours.

Some potentially dangerous operations can be *isolated* from the people nearby, which solves the exposure problem. The isolation can be by a physical barrier (such as an acoustic box to contain noise from a whining blower or a screaming rip saw), or by time (such as providing semi-automatic equipment so a person doesn't have to stay near the noisy machine constantly), or by distance (remote controls). An example of this is a new wood room in a paper mill. This is where 8-foot logs enter a huge tumbling drum which debarks them, causing rumble and claps like a thunderstorm. They then go to a chipper which disintegrates a log into 1-inch pieces in a couple of seconds with a brutal noise. The operator used to stand right above this chipper. Now he's 100 feet away in a sound deadened room where he manipulates controls in accordance with what he sees on a couple of closed-circuit TV screens. Not only is noise now no problem, but he is spared the tragic possibility of losing his balance and becoming entangled with the chipper.

Ventilation is used universally in all plants. It may be just natural building infiltration; it may be general, with fans bringing in great quantities of air and distributing it through ductwork; it may be by an occasional or a myriad of roof exhaust fans; or it may be by local exhaust hoods to prevent dust, gas, mist, or fumes from spreading around the work area. The common uses of ventilation are to heat in winter, cool in summer, and to remove air-borne contaminants from the work room.

Local exhaust systems for contaminant control consist of four main parts: enclosures, semi-enclosures, or flared shaped *hoods,* usually of tailor-made sheet metal, which should be placed close to the point where the contaminant is released to room air; *ducts,* usually round, through which an air stream flows at a high enough velocity to transport the contaminant, if it is dust, without its settling and so plugging up the pipe; an *air cleaner* to remove the contaminant (such as a cloth filter with shaker for dust, a scrubber or other device for gas, and electrostatic precipitator for fume) to keep from discharging the foreign matter to the great outdoors; and finally, a motor-driven *exhaust fan* to move the air into the hoods.

Design of these systems is rather intricate. A nurse or safety director would not be called on to undertake this task. But it is a fact not well understood either by a plant manager, or interestingly enough, even by the engineer involved, that many, maybe most, top-rank plant engineers, maintenance men, and otherwise highly qualified heating and ventilating firms, are not skillful at laying out local dust exhaust systems. All too much money has gone down the drain, with disappointing accomplishment, because an engineer or tinsmith unused to industrial needs tackled a local exhaust system. The reason? He hasn't grasped a few essential fundamentals.

Some of these might seem elementary when pointed out. They are things that a safety director might easily put to use. I mention some here as tips in the design of good exhaust systems:

1. An exhaust hood has astonishingly little ability to "reach out" and suck in the dust from its point of release. Because we