

neath the cans. The irregularities in the wire rope running under the cans produce considerable noise. Replacing the wire rope with a flat belt will result in a quieter operation, but an adjustable idler wheel must be installed because the belting is more likely to stretch than the wire rope. In addition, splicing and loading problems limit the system to fairly short runs. In spite of these difficulties, the flat-belt line may be a worth-while substitution where the can conveyors are the prime source of noise.

i. *Conveyors for Small Parts.* Small parts that are handled in bulk in metal chutes, conveyors, and elevators are often noisy as a result of the impact of the parts against each other. A single part traveling alone will move quietly if the conveyor or chute has been treated to minimize noise (page 679). Thus, the conveyor system should avoid the accumulation of parts at any point. If the storage of parts is necessary, a rubber-lined reservoir that is completely enclosed should be used.

In general, worm-feeding mechanisms are quieter than gate-feeding because parts can be taken continuously from a reservoir rather than in a noisy, rhythmic fashion.

j. *Chipping Hammers.* Noise from the impact of the chisel of a chipping hammer striking a metal casting or a steel tank can be extremely intense. Although it is unlikely that satisfactory engineering control for this problem will be found in the near future, steps can be taken that will be of some help in conserving hearing.

Chipping operations should never be carried out on metal surfaces. Wooden benches or wooden-block or dirt floors are better.

A jig that will clamp the work and minimize vibration may be practical for operations where production is high. It is necessary that large areas of the vibrating surface be damped and the forces involved are quite large. Damping materials, such as rubber, are usually ineffective, but lead sandwiched between the clamping jig and the work may be satisfactory. Submerging the work to be cleaned by chipping in a liquid bath is another method of noise control that may have some merit. The work must be supported by a frame that is isolated from the tank to prevent the transmission of vibration to the outside.

k. *Rotary Cutters.* Cutting strands or sheets of plastic into small pieces is usually accomplished by feeding the material to a set of rotating knives. The entire cutting assembly should be isolated from the rest of the device to minimize the transmission of vibration to the housing where it may be radiated as sound.

The knives and the plate that they cut against should be rigid and heavy. The knives should not strike the work all at once, but rather begin to cut on one side and progress smoothly toward the other in a shearing fashion. After one knife has completely passed through the material, the next knife should be in position to start at the opposite side. Reducing the rotational speed of the cutter reduces the noise somewhat because the knife strikes the work with a lower

velocity. Increasing the number of knives on the cutter will restore the original productive capacity of the machine.²⁷

l. *Noise from Piping.* The hammering of liquid in pipes can produce an unnecessary noise at great distances from the pumping equipment. For quiet operation, flexible sections of piping and air cushions should be installed in the vicinity of the offending valves and pumps. Commercial products and materials are available to aid in the solution of these problems.²⁸

m. *Pneumatic Hammers Used in the Manufacture of Paper Boxes.* In the paper-box industry the scrap is separated from the box by means of a vibrating chisel actuated by a chipping hammer. The reciprocating piston in the hammer strikes the end of the chisel and produces a ringing at high frequencies. The pulsating stream of air escaping from the exhaust port of the hammer produces a low-frequency sound. In contrast to chipping castings and steel tanks, the noise is produced by the tool itself. Noise reduction is obtained by using a collector bag covering the exhaust port, to channel the exhaust air to a single opening and then to a long hose (Figure 28). The muffling action of the long hose and

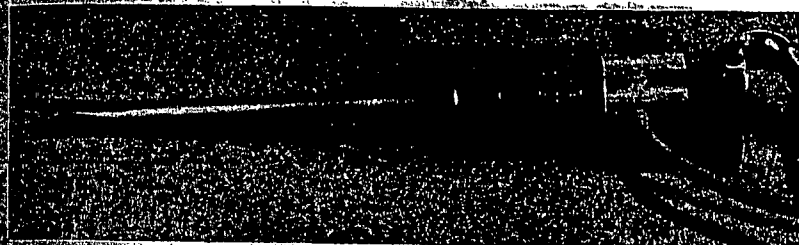


Figure 28. Exhaust collector in place on a pneumatic hammer. The use of the exhaust hose reduces the noise from this tool during certain operations in the manufacture of paper boxes.

the remote location of the noisy, open end of the hose result in an operation that is significantly quieter.²⁹

n. *Air-Operated Tools.* The sirenlike noise produced by some air-operated tools can be quieted by attaching a small silencer to the exhaust.³⁰ Since back-pressure is an important consideration, silencers of the "straight-through" variety are best suited to the task. They can be constructed from two concentric pieces of tubing with fiber glass packed between the walls. The inside tubing should be

²⁷ J. R. Cox, Noise control for a strand cutter, *Am. Ind. Hyg. Assoc. Quart.*, 15, 42 (1954).

²⁸ R. P. Callaway, F. C. Fryser, and H. G. Hardy, Techniques for evaluation of noise-generating components, *J. Acoust. Soc. Am.*, 24, 725 (1952).

²⁹ R. Plunkett, Noise reduction of pneumatic hammers, *Noise Control*, 1, 78 (January, 1955).

³⁰ W. C. Chaffee, Reduction of noise in industrial pneumatic tools, *Noise Control*, 1, 16 (March, 1955).