PROBLEMS IN PRACTICE

1 ● Does a soft pad under the ventilating machinery prevent building vibration?

It may or it may not. In some cases a soft pad causes more vibration than no pad. A flexible mounting should be carefully designed to be effective.

2 ● Are especially designed walls necessary in an equipment room to keep noise out of adjoining spaces?

Ordinarily good brick, tile, or concrete walls are satisfactory. Window and door openings should be made as tight as possible with weather-stripping, etc.

3 ● How should mechanical noise be eliminated from the duct system?

A flexible connection between the fan discharge and the duct should be used. The duct should be lined from the fan end for a certain length, depending on the degree of quietness desired.

4 ● Given the choice of two types of equipment, one generating high-pitched sounds and the other low-pitched sounds, which would you choose? Why?

The equipment generating the high-pitched noise should be chosen since high-pitched sounds are more easily absorbed than are low-pitched sounds.

5 ● In building an acoustic filter in a short duct 32 by 24 in. which direction should the splitters run?

The splitters should be installed parallel to the longest dimension, since they will provide more acoustical material per splitter.

6 ● What should be the characteristics of a good duct-lining material?

a. High noise reduction.
b. Physical strength.
c. Easy working and installation.
d. Fire resistance.
e. Cleanliness, absence of loose fibers or pieces.
f. Smooth surface to reduce air friction.

7 ● Should a ventilating duct be lagged or covered on the outside?

Yes, in some locations, and particularly in the equipment room and where the duct runs through noisy rooms to serve a quiet room. This lagging will prevent air-borne sounds from entering the duct through its sides and causing annoying sound in the quiet room.

8 ● How can cross-talk be eliminated when one duct serves two or more rooms?

Install proper filters adjacent to the grilles in each room, using splitters if the duct leads to the rooms are short.

9 ● Space limitations and maximum air velocities for the introduction of air to a broadcasting studio restrict the size of duct to 30 by 16 in. and in addition the length of branch duct which is suitable for lining with sound absorption material is limited to 22 ft. Determine the length of duct lining necessary to attenuate an average fan noise and establish a permissable room noise level.

Referring to Fig. 2 the noise level for broadcasting studio is 14 db and the corresponding duct lining factor f is 28. Minimum cross sectional dimension of duct = 16 in.

$$\frac{16 \times 28}{12} = 37.3 \text{ ft duct lining required.}$$

Maximum length of duct is 22 ft, therefore it is necessary to divide the duct with a splitter, resulting in a minimum duct dimension = 8 in.

$$\frac{8 \times 28}{12} = 18.7 \text{ ft duct lining required to attenuate an average fan noise.}$$

Chapter 31

AIR CONDITIONING IN THE TREATMENT OF DISEASE

Operating Rooms, Reducing Explosion Hazards, Post-operative Heat Stroke, Nurseries for Premature Infants, Fever Therapy, Control of Allergic Disorders, Oxygen Therapy, General Hospital Air Conditioning

IN the past few years air conditioning has made considerable progress as an adjunct in the treatment of various diseases. Among the important applications are those in operating rooms, nurseries for premature infants, maternity and delivery rooms, children's wards, clinics for arthritic patients, in heat therapy, oxygen therapy, X-ray rooms, and in the control of allergic disorders.

AIR CONDITIONING OPERATING ROOMS

The most wide application of air conditioning in hospitals is that in operating rooms. Complete air conditioning of operating wards is not only desirable but often necessary for reducing the risk of explosion of modern anesthetic gases in dry winter atmospheres, and for the protection of the patient and operating personnel against excessive summer heat.

Reducing Explosion Hazard

Explosion hazards in operating rooms have begun with the introduction of modern anesthetic gases and anesthesia apparatus. Ether administered by the old drop method is still regarded as comparatively safe; but when mixed with pure oxygen or with nitrous oxide in certain concentrations (see Table 1) the explosion hazard may be as great as with ethylene-oxygen mixtures.

During the course of ethylene anesthesia the mixture, usually 80 per cent ethylene and 20 per cent oxygen, is so rich that the danger of explosion is slight, confined to an area in the immediate vicinity of the face mask, where leakage of ethylene into the air may accumulate to the lower explosion concentration (see Table 1). The most dangerous period is at the end of the operation when the patients' lungs and apparatus are customarily *washed out* with oxygen with or without the addition of carbon dioxide. Even when this procedure is omitted, it is difficult in practice to avoid dilution of the anesthetic gas with air during the normal course of breathing following the administration of anesthesia. In either case the mixture would pass through the explosion range and extra-