steam whistle or similar device might be adequate In any case, the alarm system is no better than the level of training given employees in how to respond when the alarm is sounded (See details below, and in the next two chapters)

Emergency drills

Regardless of what method is used to alert employees, they should thoroughly understand what the signal means and how to respond in the safest possible manner Training employees to leave their work place promptly on proper signal, and to evacuate a building speedily but without confusion, is largely accomplished through fire or emergency drills Exit drills must be carefully planned and carried out in a serious manner under rigid discipline Periodic instruction sheets should be distributed to all employees, and an exit drill organization formed from the supervisory staff

Emergency exit drills also serve as a valuable check on the adequacy and condition of the exits and alarm system Any deficiency should be immediately and permanently corrected Careful plans must be made to eliminate the possibility of panic in the event of an emergency, regardless of cause, and to guarantee the smooth functioning of the emergency plan Reference should be made to the NFPA pamphlet No 7, *Recommendations For Management Control of Fire Emergencies*

Factors Contributing to Industrial Fires

To eliminate causes of fire, we must first know the many ways in which it can start, especially the most common ones A study made by the Associated Factory Mutual Fire Insurance Company of almost 25,000 industrial fires over a 10 year period indicates that the majority of fires can be traced to four general sources of ignition electrical, smoking, friction, and over-heated materials (Fig 35-7)

Electrical equipment fires

Electrical equipment should be installed and maintained in accordance with the *National Electrical Code* Over-heating of electrical equipment and arcs resulting from short circuits in improperly installed or maintained electrical equipment are two of the leading causes

Only approved (or UL-listed) equipment should be used where flammable gases or vapors may be present Electrical equipment necessary in locations which are hazardous because of the presence of flammable liquids, gases or dusts, should be designed for the particular hazardous atmosphere

Hazardous locations are divided into three classes depending on the material involved Further division is by degree or severity of the hazard Complete definitions of the several classes and divisions of hazardous locations and types of equipment for each are contained in the *National Electrical Code*, and are discussed in Chapter 33

Temporary or makeshift wiring, particularly if defective or overloaded, is an outstanding cause of electrical fires, it should not be used unless absolutely necessary and should be removed as soon as possible Over-loaded or partially grounded wiring may also heat up enough to ignite combustibles without blowing fuses or tripping circuit breakers

Portable electrical tools and extension cords should conform to the *National Electrical Code* and should be inspected at frequent intervals and repaired promptly Waterproof cords and sockets should be used in damp places, and explosion-proof fixtures and lamps should be used in the presence of highly flammable gases and vapors

All electrical equipment, particularly portable electrical tools, should be grounded for the protection of persons using it Switches, lamps, cords, fixtures, and other electrical equipment should be listed by Underwriters' Laboratories, Inc , or other recognized testing and certifying agency, and should be used only in applications for which the approval or listing was granted

Lamp bulbs should be protected by heavy lamp guards or by adequately sealed transparent enclosures, and kept away from sharp objects and kept from falling Bare bulbs should never be used when exposed to flammable dusts or vapors Lamp bulbs must be considered as potential hazards in such areas, they must be safeguarded accordingly

Employees should be instructed in the use of electrical equipment and should be prohibited from tampering, blocking circuit