

that repeated reburning and yearlong use are to blame. Examination of a number of areas repeatedly reburned has failed to show where the brush species have been finally eliminated by the seeding-reburning practice alone. On the contrary, among the outstanding indications which general study of the problem have developed are the following: (1) Douglas fir lands, short of intensive tillage practice, seldom remain permanently as forage-producing areas; (2) if the lands are given freedom from reburning, regardless of grazing use, reforestation is certain.

D. C. INGRAM.

**D**UST-EXPLOSION Hazard One of the earliest grain dust  
Exists in Nearly All explosions in the United States  
Manufacturing Plants occurred in the Washburn flour  
mills in Minneapolis on May 2,  
1878. As the result of this explosion of flour dust 18 men were killed,  
and 3 mill buildings were destroyed.

Since the explosion in 1878 so many explosions have occurred in the manufacturing plants of the United States that dust explosions are now recognized as a definite industrial hazard. The Bureau of Chemistry and Soils has found that a dust explosion is similar to a gas explosion and that combustible dusts of practically all types, when mixed with air in proper proportions, can be ignited by an external source of heat or flame. A recent census shows that at least 28,000 industrial plants in the United States are subject to the hazard of dust explosions. These plants employ approximately 1,324,000 persons, and annually manufacture products valued at more than \$10,000,000,000. Dust-explosion prevention is therefore a national economic problem.

Although the earliest dust explosions occurred in grain handling and milling plants, explosions have taken place in recent years in industries handling the following products: Starch, sugar, powdered milk, chocolate and cocoa, spice, rice, cottonseed meal, wood, hard rubber, paper, fertilizer, sulphur, zinc, aluminum and magnesium powders, pyroxylin lacquers, cork, dye materials, coal-tar pitch, and leather.

#### New Equipment Causes Risk

The dust-explosion hazard exists in practically all the manufacturing processes in industrial plants. The installation of new mechanical equipment has introduced additional hazards, and the use of electricity and electrical appliances has played a prominent part in many recent disastrous explosions. Definite progress has been made in obtaining scientific data on the causes of dust explosions in industrial plants and in the development of methods for their control and prevention, but it is apparent that the dust-explosion problem is extending into many new lines of industry, and the hazard must be recognized.

The Department of Agriculture is receiving the aid of many national organizations in reducing the loss of both life and property that results from dust explosions. In cooperation with the dust explosion hazards committee of the National Fire Protection Association, safety codes have been developed for dust-explosion prevention in the following industries: Flour and feed mills, sugar and cocoa pulverizing systems, terminal grain elevators, pulverized-fuel systems, and starch factories. These codes have been adopted by the National Board of

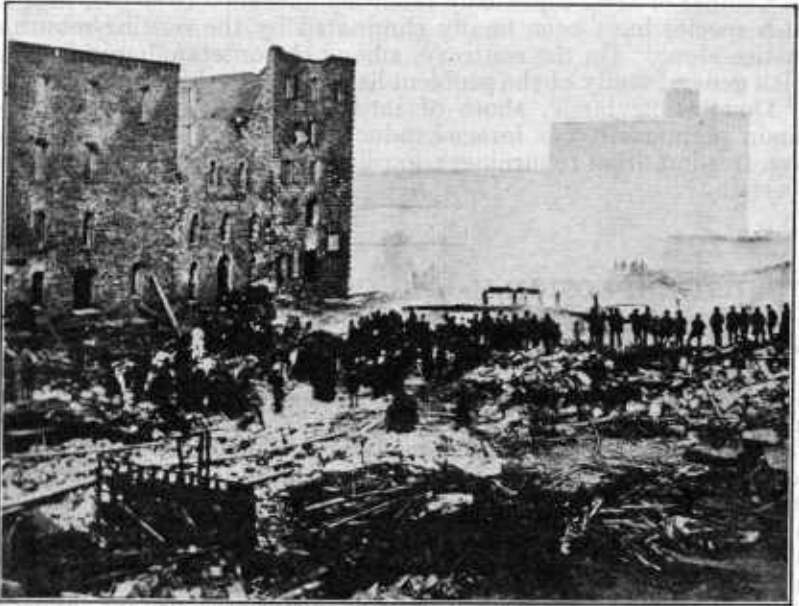


FIGURE 74.—What remained of the Washburn flour mills in Minneapolis after flour dust explosion on May 2, 1878



FIGURE 75.—The world's largest grain elevator, 10,000,000 bushels capacity, located at South Chicago, Ill., wrecked by a grain-dust explosion. The explosion killed six men and resulted in \$4,500,000 property damage

Fire Underwriters and have been approved as American standard by the American Engineering Standards Committee. The chemical engineering division of the Bureau of Chemistry and Soils is desirous

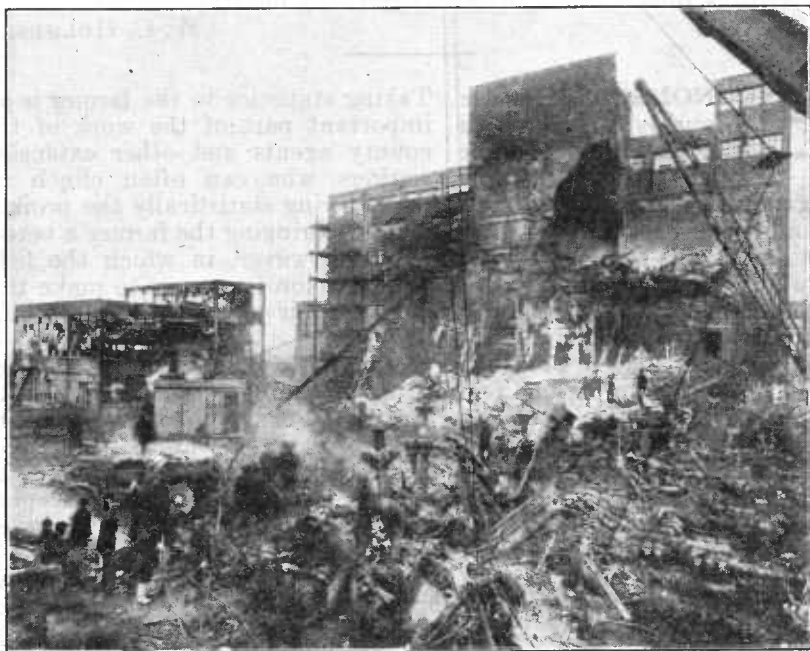


FIGURE 76.—Effects of an explosion of cornstarch dust in a Middle West factory in which 42 men were killed and many others injured

of continuing to cooperate with the industries and other interested agencies in obtaining further information regarding the dust-explosion problem and in rendering all possible assistance in the development and application of effective methods of control and prevention.

DAVID J. PRICE.

## **D**YES Important Both in Diagnosis of Disease and as Medicinal Agents

Much of our knowledge of disease, especially that caused by microorganisms, has been acquired with the aid of dyes. Suitable dyes for this purpose, known as biological stains, are of vital importance to the medical profession. The diphtheria bacillus mycobacterium tuberculosis and the malaria parasite, for example, as well as numerous other pathogenic organisms, can be detected and identified after being stained with a dye that differentiates them from surrounding substances. Thousands of staining tests are carried out daily upon cultures taken from milk and water and from diseased persons. They indicate the presence and the identity of disease-producing organisms, thereby enabling the doctor to diagnose the disease.

When stained with dye solutions, the tissue of malignant tumor may be distinguished from that of harmless tumors by microscopical examination.

Many dyes render even more direct service to health, in that they destroy or paralyze pathogenic organisms without injuring the normal