Air Conditioning Requirements of Multicolor Offset Printing, by C. G. Weber (*Refrigerating Engineering*, December, 1936, p. 6).

A Study of the Removal of Sulphur Dioxide from Library Air, by A. E. Kimberly and A. L. Emley (*U. S. Bureau of Standards Miscellaneous Publication*, No. 142, October 17, 1933).

Reactions of Lithographic Papers to Variations in Humidity and Temperature, by C. G. Weber and L. W. Snyder (*U. S. Bureau Standards Journal Research*, January, 1934).

The Treatment of Offset Papers for Optimum Register, by C. G. Weber and M. N. V. Geib (*U. S. Bureau Standards Journal Research*, February, 1936).

Summary Report of National Bureau of Standards Research on Preservation of Records, by A. E. Kimberly and B. W. Scribner (*U. S. Bureau of Standards Miscellaneous Publication*, No. 154, March 16, 1937).

MISCELLANEOUS

Effect of Air Conditioning upon Munitions, by J. I. Lyle (A.S.H.V.E. TRANSACTIONS, Vol. 23, 1917, p. 383).

Air Conditioning in Industrial Processes (Match Factory), by W. L. Fleisher (*Heating, Piping and Air Conditioning*, March, 1931, p. 196).

Air Conditioning as Applied in Theatres and Film Laboratories, by D. C. Lindsay (*Transactions Society of Motion Picture Engineers*, April, 1927, Vol. XI, No. 30, p. 335-365).

Air Conditioning for Textile Plants Making and Using Synthetic Yarns, by L. L. Lewis (*Rayon Textile Monthly*, July, August, September, 1930).

Relation of Air Conditions to Tobacco Curing, by J. Johnson and W. B. Ogden (*Wisconsin Agricultural Research Bureau* 110: 1-48, 1931).

An Investigation of the Bacterial Contamination of the Air of Textile Mills with Special Reference to the Influence of Artificial Humidification, by W. F. Wells and E. C. Riley (*The Journal of Industrial Hygiene and Toxicology*, Vol. 19, No. 10, December, 1937).

Chapter 40

INDUSTRIAL EXHAUST SYSTEMS

Classification of Systems, Hood Design Principles, Requirements for Suction and Velocity, Duct System Design, Collectors, Resistance of System, Efficiency of Exhaust Systems, Types of Fans, Protection Against Corrosion

IN many industries some type of exhaust system designed to collect and remove dusts and fumes is essential to the efficiency, economy, and safety of operation. General design information is included in this chapter which is intended to relate primarily to industrial exhaust systems.

CLASSIFICATION OF SYSTEMS

In general there are two basic layouts of exhaust systems, the central and the multiple unit system. In the central system a fan is located near the center of operations with a piping system radiating to the various machines to be served. In the multiple unit system, which is sometimes employed where the machines to be served are widely scattered, or where the operations are apt to be independent or intermittent, small individual exhaust fans are located at the center of the machine groups or at each machine. The unit arrangement has the advantage of flexibility.

Exhaust systems are also classified by the means employed to collect the material. The dust or refuse may be collected and controlled by enclosing hoods or open hoods with positive inward air movement or by exhausting the general air of the room. With some classes of machinery it is not feasible to hood the machines closely and in these cases open hoods over or adjacent to the machines are provided to collect as much as possible of the dust and fumes. This class includes such machines as rubber mills, package filling machinery, sand blast, crushers, forges, pickling tanks, melting furnaces, and the unloading points of various types of conveyors.

The open hoods should be placed as close to the source of dust or fumes as possible, with due regard to the movements of the operator and should be placed so that the operator is in no case in the path of the exhausted material. When the hood must be placed at some distance above the machine it should be large enough to cover a large area as diffusion is usually quite rapid.

Some consideration should be given to the natural movement of the fumes. For those that are lighter than air, the hood may be over or above