

of their machines. Consideration of the problem of exhaust ventilation before the machine is built will result, in most cases, in a more satisfactory solution than is given by the compromise that must be adopted in fitting the hood to the finished machine.

706 Proper operation and maintenance of an exhaust system should include: (1) Routine inspection and repair or replacement of worn and damaged parts; (2) proper maintenance of the fan and other moving parts; (3) operation of the air-cleaning equipment in accordance with the instructions of the designing engineer and the manufacturer of the equipment; (4) instruction to the workers in the proper use of the system for their maximum safety and comfort; (5) report to proper plant executive any wear, non-use or abuse of facilities.

#### 707 METHOD OF TESTING EXHAUST SYSTEM FOR EFFICIENCY OF OPERATION.

(a) It is essential to make certain (1) that the design is fundamentally sound; (2) that the system is operated in accordance with the instructions of the designing engineer and the manufacturer of the equipment; (3) that the system be properly maintained.

(b) The measurement of concentration of polluting material in the atmosphere of the plant constitutes the basic means of measuring the effectiveness of control secured by an exhaust system. Suitable methods of sampling and measurement must be employed and the results compared with accepted standards<sup>1</sup> of permissible concentration of the contaminating substance.

(c) A few tests cannot be relied upon to give a true

<sup>1</sup>NOTE: An ASA National Advisory Committee on Toxic Dusts and Gases has been appointed to prepare standards of permissible concentration of various contaminating substances.

measure of control over a long period of time. A routine testing schedule is necessary which must be augmented by special tests whenever changes in the operations are made, such as adding new machines, changing the composition of chemicals which alters the rate of volatilization, etc.

(d) MEASUREMENTS OF AIR FLOW. Routine measurement of air flow through the system indicates whether it is operating in accordance with the original design. Measurement of static suction at the throat of the exhaust hood provides the simplest index of operation but it may be safely employed for this purpose, only when the coefficient of restriction,  $f$ , is not changed by damage to the hood. The measurement of the velocity pressure by means of a pitot tube<sup>2</sup> in the branch pipes and in the main pipe as well provides a more exact means of determining the volume of air flowing into the various hoods and through the system and in addition gives direct information concerning the transporting velocities in the system. The accurate determination of average velocity at any cross-section, however, requires more skill and time than is required for the determination of static suction. Care must be exercised to keep the pitot tube from plugging when used in measuring the velocity of dust-laden air. (Pitot tubes of special design have been used for this purpose.) In certain cases it is desirable to provide a flowmeter of some type in the main line to indicate the total volume of air handled by the system. A pitot tube may be employed for this purpose, although a meter section of the venturi type provides a more permanent measuring apparatus.

708 The exhaust system shall be kept in operation whenever any machines connected to it are in use.

<sup>2</sup>NOTE: For the determination of low air velocities (below 1000 f.p.m.) the silvered Kata thermometer or other suitable velocity meter must be employed.

## District Heating in Rochester

STEAM customers of the Rochester (N. Y.) Gas and Electric Corporation have increased in number from 254 in 1926 to 329 in 1936, a gain of 29.5%, according to that company's Year Book, an especially attractive publication issued in March. During the same period the company increased its coke sales 65%, from 135,980 tons in 1926 to 224,696 tons in 1936. In 1936 this utility had over 110,000 gas customers. Of the total gas sold to these customers 16.2% were for house-heating.

Concerning the company's steam production and distribution the Year Book says:

The steam production and send-out from all five of the company's district steam plants was greater in 1936 than in any year since 1930. The total send-out in 1936 was 1,387,983,000 lb. Station No. 3, in Rochester's central Genesee River factory district, showed a considerable increase due to improved industrial conditions. During 1936 construction progressed on another new 700-lb., 750°, 7000-hp., million dollar boiler at Station No. 3. This boiler will supply steam to the station's electric generators and will supplement, through bleeding and reducing valves, the station's steam send-out. Station No. 9 at Lincoln Park, Station No. 35 at Litchfield Street, Station No. 11 at Goodman Street, and Station No. 8 on Lawn Street, all have enjoyed additional business.

Because of new steam business and the increased de-

mands for steam by present customers, the following major mains and services were constructed: An 8-in. high pressure booster steam main approximately 1000 ft. long was installed from a point just south of the Curtice Canning Company's plant on Curtice Street, near the east end of Smith Street bridge, to distributing Station No. 34, adjacent to Bausch and Lomb Optical Company. This main runs for a short distance overground along the crest of the Genesee river bank, then underground through the Curtice Company property and basements, and thence underground through the Bartholomay Brewing Company's property. The Bartholomay Brewing Company will be served from this main as soon as its boiler plant operation is discontinued. This main will increase the supply of steam available for distribution to the many important customers in this section and was particularly installed to handle the new loads at Aplo Clothing Company and at the Hickok Manufacturing Company. To reach the Hickok Company a new 4-in. high pressure steam main approximately 600 ft. long was constructed above ground along a railroad branch right-of-way and underground under a building materials supply yard to the Hickok Company's former boiler room. About 150 ft. of 4-in. low-pressure main was also constructed to serve the new stores, including Rudolph's, at the southeast corner of Main Street, and South Avenue.