Suction hoods, which have been removed to adjust the machines, should be replaced as soon as the adjustments are completed.

Never start a machine with the blast gate closed, as the slight air leakage past the blast gate may draw material into the pipe and clog it.

Disconnect furnace feeders from the furnaces when not in operation, and do not overload the system by ill-advised additions.

CHAPTER XXVII

MECHANICAL DRAFT

THERE is a certain draft which will give the best results for every kind of fuel and rate of combustion. The amount of fuel that can be burned per hour per square foot of grate surface is governed by the quality and the type of fuel as well as by the draft obtainable. Mechanical draft is used to obtain economy of operation, increased capacity or both and may be accomplished by either the forced or induced method. The two common methods of producing mechanical draft are by means of fans or steam jets. Each method has its advantages and design conditions will govern the choice of apparatus. Steam jets are reliable, have nothing to break or wear out and are more economical to install. On the other hand fans usually take more power to operate and in cases where fan engines or turbines are used steam can be recovered in the water heater or condensers.

Mechanical draft fans are usually either disc or centrifugal type and because of the severe service to which they are subjected they must be of rugged construction, well balanced, must be able to operate continuously, withstand high stresses, maintain the proper pressure and horse power characteristics and show a good efficiency over a wide range of operative conditions.

The amount of coal that can be burned per hour per square foot of grate surface is governed by the quality and type of coal as well as the amount of draft available. Mechanical draft fans should be of such capacity that they will be able to handle the quantity of gases produced. If it is assumed that 5 lb. of coal per boiler horse power at 24 lb. of flue gases per pound of coal there would be 120 lb. of flue gases per hour to handle.

The volume of flue gases may be easily computed from the density of gases at the flue temperature and the size of fan to be provided may be obtained from the maker's table. No attempt should be made to put more air through existing boilers by speeding up the fans as the power consumption will be increased too rapidly. With the fuel bed at constant thickness, doubling the weight of air requires about 3½ times the draft pressure difference, and trebling the weight of air about 6 times. Under the first condition the fan would require 6½ times the weight of steam, so it can be seen that the most efficient fan must be selected for boilers to be driven at a high rating.

The effects of running a fan under conditions other than those for which it is designed are graphically shown by the performance curves of any given fan.

Where the size of the openings and the length of the pipe remain constant the volume of air handled by any fan increases almost directly,