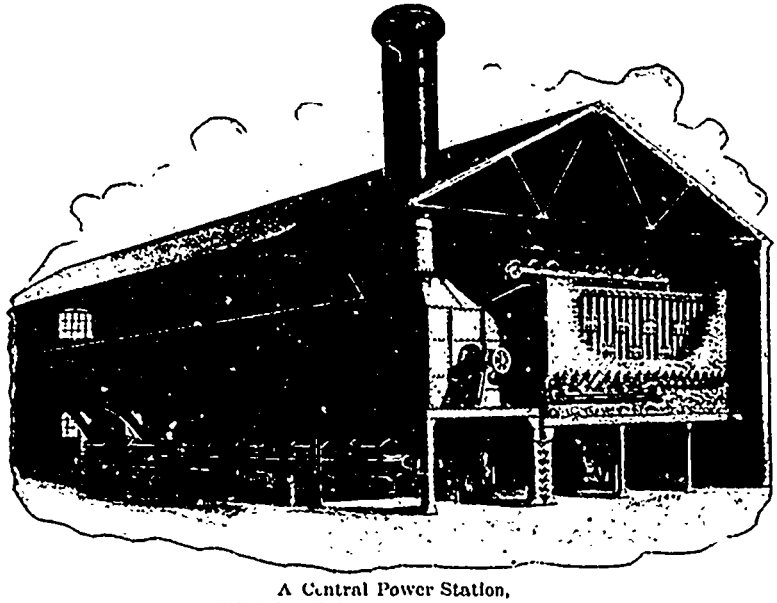
inability to meet increased demands, such as the varying conditions of boiler practice impose.

The chimney is purely and simply a device for moving air, and for such purposes a more wasteful mode could hardly be devised. Since heat is convertable in a definite ratio into mechanical energy, we can easily compare the work accomplished with that which is expended. Assume, for example, an interior temperature of 500 degrees Fahr. and an exterior temperature of 32 degrees. Then a simple calculation will serve to show that the heat in one pound of the gases above 32 degrees Fahr. is equivalent to sufficient mechanical energy to raise its own weight approximately a height of 90,000 feet. If therefore the chimney is but 100 feet high, only one nine-hundredth part of the heat is utilized. In other words the efficiency of the chimney is about one-tenth of one per cent., the remaining 99.9 per cent. overcoming the flue and chimney friction, escaping as radiant heat or being discharged at the top as sensible heat of the gases. This latter factor is by far the largest, of course. We can from this also see that the efficiency of a chimney increases as its height; a 500 foot chimney would transform into useful effect one-half of one per cent of the energy supplied it. If now we replace the 100 foot chimney by a fan, the efficiency of this arrangement, with boiler and engine, may well lie somewhere between three and four per cent., or from thirty to forty times as great as the chimney, a figure which will be greatly increased if the fan engine exhaust is utilized. This brings us, therefore, to a consideration of draft production by mechanical means.

The first and crudest method of forced draft production was the steam jet. This is a device of exceeding wastefulness, and will not here be considered. The use of fans for draft purposes may be classified under the heads of forced and induced draft.

The first of these two methods consists of forcing air under the grates of the furnace, and may be applied either by the closed ash-pit or the closed stoke-hole system, the latter being extensively used in naval practice. Forced draft is usually installed to provide for an increased steaming capacity, or to help out an overloaded chimney, or to enable low grades of fuel to be successfully employed. Of the cuts herewith appended, the first illustrates the application of forced draft to a battery of boilers by the closed ash-pit system. The three quarter housing Buffalo steel-plate fan driven by a direct connected engine, supplies air under pressure to a main blast-pipe, from which the branch pipe lead off to dampers similar to the one shown in the second cut, which are placed in the bridge walls. Such is forced draft.

Mechanical induced draft consists in the application of fans between the boiler and the stack for the purpose of effecting a rapid movement of the gaseous products of combustion. By thus reducing the pressure in the smoke connections of the boiler, the effective draft pressure is increased, resulting in an increased supply of oxygen to the fuel. In other words, for the chimney is substituted a mechanical agent, at once vigorous, positive and flexible. Having seen how much more efficient than the chimney the fan is, it is only natural to expect a material saving by the use of the latter.



A Central Power Station,
with induced draft, economizers, etc.