Test Number 3.

Register temperature = 197.5 deg. fahr. (Draft = 0.16 in. and combustion rate = 6.5 lb. per sq. ft. of grate.)

452 × 134 = 60,500
228 × 168 = 38,400
128 × 243 = 31,000
130,000 B.t.u. per hr.

By merely increasing the draft and combustion rate, the register temperature has been raised from 141.2 deg. fahr. to 197.5 deg. fahr., and the heat-capacity has been increased from 58,500 to 130,000 B.t.u. per hr., or an *increase of 122 per cent, but the free area through the furnace, and the leader pipe area have remained the same.*

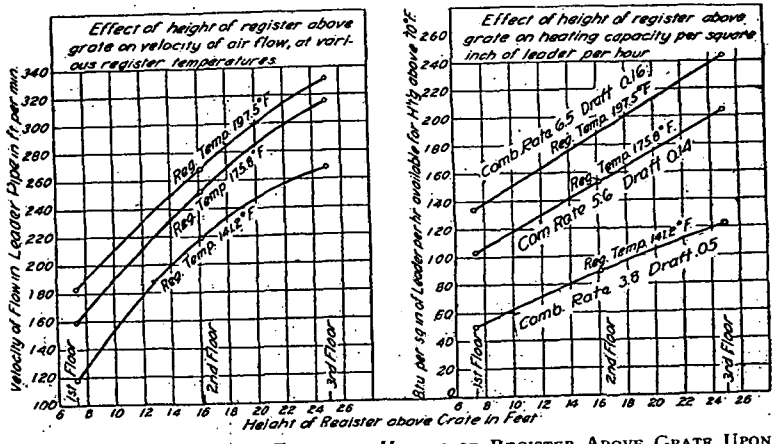

FIG. 49. CHARTS SHOWING EFFECT OF HEIGHT OF REGISTER ABOVE GRATE UPON VELOCITY OF AIR FLOW AND HEATING CAPACITY

It should, therefore, be apparent that the rating of any furnace in square inches of leader pipe area means nothing unless the air temperature at the registers is also definitely stated at the same time.

The preceding discussion is in no sense an argument against rating on the free area basis, but rather an argument to show the manufacturer and the installer the vital importance of fixing upon some standard register temperature, so that ratings in square inches of leader pipe area will be definite and can be made comparable and understandable by both the manufacturer and the engineer. The Advisory Committee on Furnace Research of the *National Warm Air Heating and Ventilating Association* has recently approved a maximum register temperature of 180 deg. fahr. for warm air furnace heating systems.

Every manufacturer of warm air furnaces should give this matter his careful consideration for the fixing of the register temperature places a definite maximum rating on each of his furnaces.

CHAPTER X

OIL FUEL FOR INDUSTRIAL AND DOMESTIC HEATING

INDUSTRIAL OIL BURNING

THE general use of coal in the United States and the decline of the use of wood as fuel began about 100 years ago, and like the inhabitants of the country was confined to the Atlantic seacoast. The bituminous coals first used were imported from England and afterward they came from Virginia mines and other fields as population spread. Anthracite coal was first sent down the Delaware River and afterward came by the canal routes that served during the early part of the century. From Philadelphia this coal was at first distributed on the Atlantic Coast by means of sailing vessels and with the advent of the railroads, the bulk of this distribution was affected by rail transportation.

One hundred years after these events, a new form of fuel, bids for a place in the world of combustion. This fuel is *liquid in form*, being petroleum in its constituent parts. There is claimed for liquid fuel, the advantages of space for storage, simplicity in location of storage adjacent to boilers and means of transportation from the remote points of storage to boiler, reduction in labor and handling of fuel, the elimination of ash removal, ease of control of furnace temperatures, and the elimination of the expense of banked fires. Each case, however, where the liquid fuel is contemplated will have, of necessity, to stand on its merit. The heating engineer must figure out the operating cost both with coal and with oil, and the user will have to evaluate the extra convenience, after which a decision can be made as to what type of fuel should be used.

Crude oil has either a paraffin or asphalt base, or a blending of the two. Fuel oil, is heavy, dark in color and has a greater viscosity, higher calorific value and higher flash point than the crude oil from which it is made. It results from the distillation of crude oil during which processes naptha, benzine, gasoline, kerosene and other distillates are removed. The character of the fuel oil varies in accordance with the extent to which the crude oil has been refined.

In the selection of burner equipment and in the determination of storage facilities, it is well to decide what grade of oil is to be used, its Baumè gravity, viscosity, flash point, and cold test, or temperature at which it will cease to be fluid.

Material for this article was furnished especially for THE GUIDE by Byron K. Eaton, Chicago, and A. H. Ballard, New York.