through the ash door of the boiler, and its damper can be adjusted to suit conditions. The air is heated as it rises through the openings between the intensely heated fire-brick. The heated air then mingles with the straight-shot flame, projecting into the boiler, thus giving that additional air required for completion of combustion.

A wide, long, high combustion chamber is ideal, within certain limits. It is only necessary to extend checker or protecting walls where there are water-drop legs projecting downward from the crown-sheet. All such water surfaces must be protected from any direct contact with the fire. It is well to brick up the sides of boilers, of fire-box or sectional type, to a point 8 or 9 in. higher than the center-line of the burners. Impingement walls should be so built as to properly deflect the gases of combustion.

The brick used should be of the very highest heat-resisting type and each brick should be dipped in a thin batter of heat-resisting cement and water and laid up tightly to the next brick. This will give a very excellent wall which will require a minimum of attention. Oil burner manufacturers have plans for the bricking of the various types of boilers, which plans are usually submitted after the contract has been approved.

There are a number of oil heaters on the market, which are meritorious. If low pressure steam boilers are being equipped with oil burners, ordinary coil waterheaters may be connected below the water-line of the boiler. Sufficient heater capacity should be installed to bring the temperature of the oil up to within 25 or 30 deg. of its flash-point. This pre-heating of the oil not only decreases the viscosity but takes a certain combustion burden from the fire in the boilers and also tends to carry in suspension basic deposits which might otherwise be left in the burners. In high pressure work, coil heaters can be connected into the exhaust or live steam lines depending upon the type of heater selected.

Naturally, the heavier the oil, the greater will be the tendency towards sediment deposit consequently strainers must be provided. Unless the oil is exceedingly heavy, a single strainer in the suction line just before it enters the pumping equipment, will be sufficient. This strainer can be so built as to be easily accessible for cleaning. In some instances, duplex strainers are used, in which case, the mere throwing of a lever, will change the flow of oil from one strainer to another, so that cleaning can be accomplished without interfering with the supply of oil.

The question of the elevation of the pump is of some importance, as some communities prohibit the installation of oil pumping equipment at a point lower than the top of the oil storage tank. As the result, it is frequently necessary to build platforms in the boiler-room on which to mount the pumping equipment, so that there will be no danger of siphoning. If this is not done anti-siphoning devices should be used.

While fuel oil burners are not automatic in character, yet a great many burner companies provide automatic regulators to maintain a fire between "high-low" limits, so as to maintain uniform pressures.

The foregoing discussion refers continually to boilers, it must not be lost sight of that oil fuel is adaptable to scores of industrial purposes. Bake ovens, melting pots, annealing furnaces, dryers and countless other heat demanding units are continually and adequately operated with this modern fuel.

DOMESTIC OIL BURNERS

The problem of applying oil fuel to residential heating is essentially different from that pertaining to industrial installations. While in an industrial installation the size of the plant usually warrants the necessary investment for installing auxiliary equipment for preheating and atomizing the heavy fuel oils such investment is seldom warranted in the small plant required in a residence. Further, the hazard associated with preheating and the complication incident with atomization is an added factor weighing against the use of heavy oils for this purpose. These facts results in the use of lighter or higher Baumè gravity oils for domestic purposes. These oils which include gas oil, distillate, and kerosene are liquids of low viscosity even at zero temperature.

The problem of oil storage is relatively simple, since all the fuel may be stored in tanks buried outside. One-thousand gallon tanks of 3/16 in. steel seem to be most popular although the two and three thousand gallon sizes are coming into considerable favor. In estimating the size of storage tank it is well to remember that 170 gal. of oil is approximately equivalent to 1 ton of coal.

Inquiry should be made as to the available truck capacities before selecting tank sizes, as the tank should be large enough to accommodate an entire truck-load of oil, while still containing a "working balance."

Local ordinances should be strictly adhered to. Some cities require that a buried tank shall be at least 2 ft. beneath the surface of the ground and at least five feet from a building wall. Others provide that a line drawn at 45 degrees from the junction of the basement floor and the building wall, shall not touch the tank.

The tappings, 2½ in. fill, 1 in. vent and 1 in. oil suction, should all be in the top of the tank. Manholes, oil return lines and steam coils are unnecessary in tanks for the kind of oil suitable for residential work.

In the low-priced burners utilizing basement auxiliary tanks, such tanks should be at least 10 ft. from the nearest fire; they should be replenished by hand pumps connected to the main oil tank buried outside. Where no outside storage is provided, these auxiliary tanks should be filled and vented outside, and should also be provided with a tight-fitting, float gage, so that if the tanks are over-filled, there can be no spilling of oil in the basement.

The thermostatic equipment should consist of a room thermostat, centrally located in a position, representative of the general home temperature, remote from any source of heat or cold, and a boiler control to prevent the temperature of the water or the steam pressure from exceeding a predetermined point.

While oil burners are most successfully operating in hundreds of different makes and styles of boilers and furnaces yet in planning new heating systems the adaptability of boilers to oil burning should be given serious consideration. Generally speaking, boilers with a preponderance of indirect or flue surfaces, are best suited to oil burning, because an oil fire develops a considerably hotter flame than does coal. This means higher combustion gas temperatures, and naturally demands more heat absorbing, water-backed flue surfaces.