

that the dampers will always be held shut by springs or weights when no air is permitted to pass or when the air compressor is shut down.

Direct-Indirect Radiators

Direct-indirect radiators are usually housed in, having cold air inlets at their bases, and give rather a make-shift type of ventilation. It is not practicable usually to install mixing dampers, such as are used with fan-units, in these, and since the heating surface is in a single radiator calculated for the coldest air inlet temperature, regulation is difficult. The best results are obtained, where the use of direct-indirect radiators is necessary, by installing slow acting thermostats on special brackets directly above the radiators where the thermostat will be exposed to the

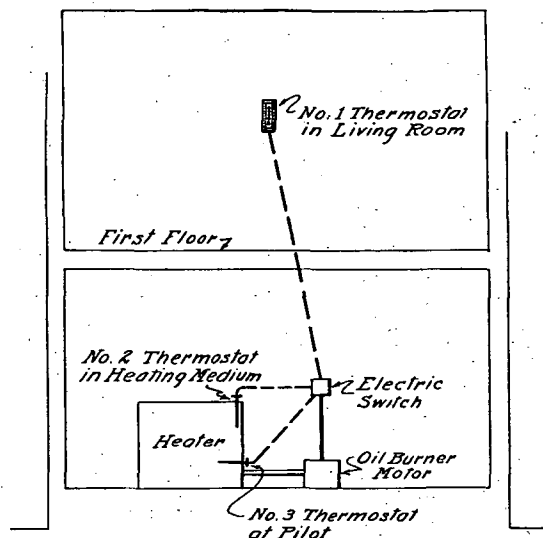


FIG. 9. TYPICAL ARRANGEMENT FOR OIL BURNER

air currents from the outside, and arranging for these to receive air only through additional thermostats placed in the room and controlling the direct radiators. There should be a vacuum system of steam circulation, and the thermostats should be of slow or intermediate acting type, operating on the supply valves to the radiators.

Hot-Water Radiators

Hot-water radiators lend themselves to automatic heat control, especially where the circulation of water is of the forced type, but as the radiators heat and cool rather slowly, there will be some temperature fluctuation or range at the thermostat, especially when the radiator surface is excessive in amount. It is wise to use supply valves which will close tightly and to place lock-shield valves on the return ends of radiators, to facilitate repairs, and the lock-shield valves may prove invaluable in equalizing with great nicety the circulation.

In residence heating with hot-water it often suffices to install a general thermostat in some representative room, which controls the draft, as with coal, or which controls the fire, as with gas or oil, but there should always be furnished in addition a thermostat in the water or circulating medium which will reinforce the general thermostat and which will prevent boiling over in case the general thermostat should be subjected to unfair exposure, such as an open window.

Warm-Air Heating

With warm-air heating from furnaces, with fans, as in public buildings, it is always necessary to provide a supply of tempered air for cooling after the rooms become warm. A duct thermostat and dampers easily and positively will accomplish this, either by mixing some cold air with heated air from the furnaces in an intermediate chamber, or by injecting some hot air from the furnaces into the cold air at the fan inlet, recirculating a measured and controlled part of the air around the furnaces. The room temperatures are controlled by intermediate thermostats and double mixing dampers the same as for a steam system.

Warm-air heating for residences may be controlled by a general thermostat in a representative room, and again, as with hot water, an additional thermostat at the furnace in the warm-air chamber is desirable to reinforce the general thermostat.

Service Hot-Water Heating

It is safe to say that no service hot-water heater should ever be installed without automatic heat control. Automatic heat control for this service not only saves fuel, but also prevents scalding and damage to materials. It also brings about a great reduction in maintenance of valves, pipes, and fixtures. A unit type thermostat is most desirable, since it will function whether or not the general mechanical apparatus is in service, and will control steam and return valves or draft dampers, oil or gas fires, or electric heaters.

In hotels, hospitals, and similar institutions, there should always be at least two independent water heaters, one having very hot water for kitchen uses, the other having water of medium temperature for bath and lavatory purposes, both controlled automatically. Thermostatic anti-scalding devices are available for showers and the like, but these will not prevent the great heat waste due to maintenance of scalding temperatures for bath water. No kitchen administration is satisfied without very hot water, but this demand is intermittent and small in volume as compared with usual bath and lavatory demands.

Oil Burner Control

No oil burning apparatus, unless provided with automatic heat control, can compete in operating cost with coal. An approved method for residence heating with oil is to install the following combination:

1. A general thermostat in a representative room, controlling the electric supply to the burner motor.
2. A second thermostat in the boiler or furnace which will take control should No. 1 thermostat fail to prevent improper or unsafe temperature being maintained inside the heater.
3. A third thermostat at the gas pilot which, unless kept warm by the pilot flame, will bring about the opening of the main switch to the burner motor, thus insuring that no fuel shall be injected unless a flame is in being surely to ignite it.