4. A *Free Delivery Type Unit* takes in air and discharges it directly to the space to be treated without external elements which impose air resistance.

5. A *Pressure Type Unit* is for use with one or more external elements which impose air resistance.

UNIT HEATERS

A unit heater consists of the combination of a heating element and fan or blower having a common enclosure and placed within or adjacent to the space to be heated. Generally no ducts are attached to inlets or outlets, although it is common practice with many unit heater applications to equip the heaters with directional outlets or adjustable louvers.

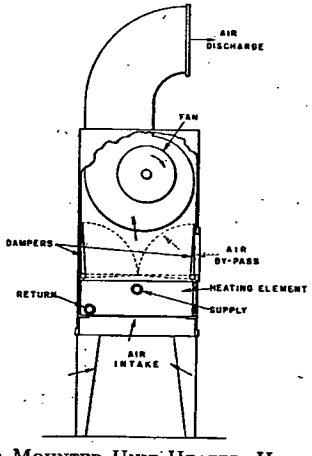


FIG. 1. FLOOR MOUNTED UNIT HEATER, HOUSED TYPE FAN

While unit heaters are designed primarily to handle all recirculated air, they may be installed to handle either partial or total outdoor air.

The heating surface may be in the form of non-ferrous or steel pipe coils, non-ferrous or steel pipe with extended surfaces, cast-iron, or pressed or built-up sections of the cartridge or automotive type. The heating medium may be steam, hot water, gas or electricity. Air is always forced over or drawn through the heat transfer surface by a fan of either the propeller or centrifugal type. Direct fired units using coal, oil or gas for fuel are available. A properly designed and applied unit heater should:

1. Circulate air in the building at a rapid rate but without objectionable draft.
2. Reduce the temperature differential between the floor and ceiling.
3. Direct the heated air so that uniform temperature distribution will be obtained throughout the heated space.
4. Prevent or remove the cold stratum of air commonly found at the floor level.
5. Maintain a closer control of room temperature either manually or by means of simple thermostats.
6. Provide a means of saving floor area or room space due to the compactness of the equipment and flexibility of application.

Types of Units

There are two major types of unit heaters, centrifugal housed fan type and propeller fan type. The housed fan type, as illustrated by Figs. 1 and 2, delivers air at high velocity (1500 to 2500 fpm) and is equipped with outlets adjustable to deliver air in several directions. They are able to project their heating effect over distances of from 30 ft to as much as 200 ft from the unit. However, they are more suited to long than short blow, except where the units are mounted high above the floor and discharge at a sharp angle downward. As a rule these units can be located at considerable distances from each other, thus reducing the piping and conserving floor space usually allotted to heating equipment.

The propeller fan type is divided into two classes of horizontal and vertical blow. The horizontal blow type, illustrated by Fig. 3, discharges air at

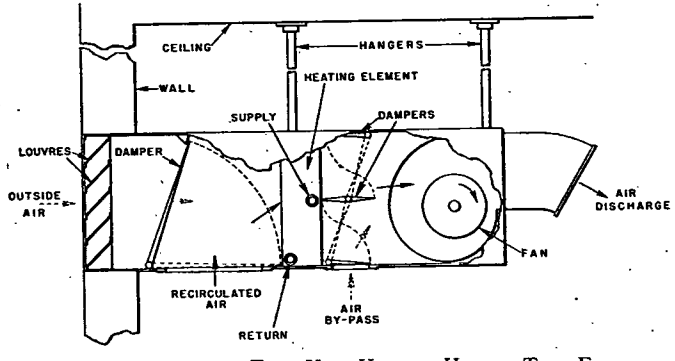


FIG. 2. SUSPENDED TYPE UNIT HEATER, HOUSED TYPE FAN

from 400 to 1000 fpm. It takes care of medium distances of blow, up to approximately 100 ft where mounting height is not too great and where other conditions are favorable such as final temperature and mass of air handled by the unit.

The vertical blow unit, illustrated by Fig. 4, discharges air at from 1200 to 2200 fpm. These are mounted on ceilings of rooms or up in the roof trusses and blow vertically downward. Various diffusers are available to take care of the height and space conditions. These units are applied to elevations of from approximately 10 ft to around 50 ft above the floor. Where mounted in roof trusses, as in industrial buildings, they do not interfere with traveling cranes and therefore permit application with overhead piping. A code[2] governing the number of sizes of propeller fan units as well as standardization of fan motors and the method of specifying outlet velocities has been adopted.

Ratings

Standard practice is to rate unit heaters in Btu per hour at a given temperature of air entering the heater and at a given steam pressure

[2]Standards for Propeller Type Unit Heaters prepared and adopted by the *Industrial Unit Heater Association*, June, 1938.