must be supplied to the condensing unit enclosure cooling coil, thus defeating the purpose of the evaporative condenser to conserve water.

Ratings

There are two codes governing the rating and testing of air conditioning units. The first code, Standard Method of Rating and Testing Air Conditioning Equipment[3], covers all types of air conditioning units except the self-contained type. The latter is covered by the Standard Method of Rating and Testing Self-Contained Air Conditioning Units for Comfort Cooling[4]. The two codes are necessary because of the basic difference caused by the heat given up by the self-contained units.

Self-contained air conditioning unit ratings are expressed in the code in terms of the effect produced on air such as:

1. The net total room cooling effect in Btu per hour. This is the actual heat removed from the room and is equal to the gross cooling effect less the heat given back to the room by the unit.
2. The net room dehumidifying effect in Btu per hour.
3. The net room sensible cooling effect in Btu per hour.
4. The sensible heating effect in Btu per hour.
5. The humidifying effect in pounds per hour.
6. The total air capacity in cubic feet per minute of standard air.

The standard rating basis as given in the code for self-contained units is tabulated in Table 1.

The standard rating basis for air conditioning units is similar to that given previously for self-contained units except the relative humidity of the entering air is specified as 50 per cent (66.7 F wet-bulb) instead of specifying the wet-bulb temperature as 67 F and the suction saturated refrigerant temperature is specified as 40 F for comfort cooling since an air conditioning unit does not include a condensing unit. The suction saturated refrigerant temperature of a self-contained air conditioning unit is not given in Table 1 as a basis of rating since this temperature is the temperature obtained when the self-contained unit operates as a system at the conditions given in Table 1. It is expected that the entering air conditions for the standard rating will agree when the code, Standard Method of Rating and Testing Air Conditioning Equipment, is revised.

COOLING UNITS

Cooling units may be used either in comfort cooling or commercial applications. As applied to industrial product conditioning and processing they are similar in construction to unit heaters described in Chapter 22 except that the heat transfer surface is supplied with refrigeration instead of heat. They are normally installed within the space to be served, or at least closely adjacent thereto.

Product cooling was originally accomplished by means of stationary pipe coils. This was later supplemented with the forced fan bunker systems in which air was passed over banks of coils. Today the coils

[3]Loc. Cit. Note 1.
[4]Loc. Cit. Note 2.

and fan are encased in an enclosure and controls are provided to maintain an average coil surface temperature. Thus, for any installation, the depth of coil, air flow, and face area determine the relation between dry-bulb temperature reduction and wet-bulb temperature reduction. Occasionally they are provided to receive outside air in which case this air is invariably filtered or washed to prevent any possible contamination of the product.

Features of Units

The principal field for cooling units is in cold storage plants, fur storage, fruit packing houses, provision stores, brewery fermentation and stock rooms, candy plants, and other industrial process work. In replacing bunker and wall coils in meat storage plants, cooling units give distinct advantages in compactness, lower first cost and maintenance expense, ease of defrosting, freedom from drip and the maintenance of sanitary conditions, as well as uniform temperature and humidity under variable load conditions. Cooling units by means of their positive air

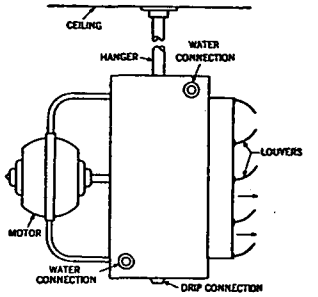

FIG. 9. CEILING TYPE COOLING UNIT

circulation prevent dead-air spots, frequently objectionable in this industry.

Types of Units

Cooling units are provided in two major types similar to unit heaters, either floor mounted with housed fan, or suspended with propeller type fans. Normally, air outlet velocities are lower than for heating, due largely to the effect of high velocities on the product. Cooling units are normally of the free delivery type although they occasionally are supplemented with duct work to provide more careful air distribution.

Typical cooling units are shown in Figs. 9, 10, and 11. Fig. 9 indicates a suspended type cooling unit which may be designed with or without a moisture eliminator. If high air velocities are maintained, an eliminator will be necessary to prevent the drops of moisture from being carried through with the air. The condensation that occurs is collected in a drip pan and removed from the system through a drain pipe. Fig. 10 indicates a typical floor-mounted unit of the housed fan type. The illustration shows a common form of distributing outlet designed to give low outlet velocities together with a controlled distribution. In process work, it is