

least closely adjacent thereto. 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.

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.

Product cooling originally was 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. The present trend in this field is toward a more accurate control of both temperature and humidity, thus placing these units in the classification of complete air conditioning units as discussed in the next section. However, in the majority of these cases dry-bulb temperature is controlled separately from the control of humidity, thus classifying these units as cooling units.

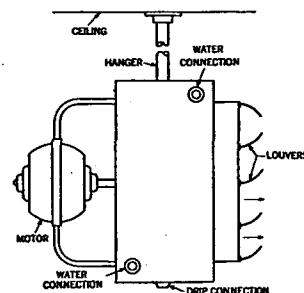


FIG. 9. CEILING TYPE COOLING UNIT

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

Typical cooling units are shown in Figs. 9 and 10. The former 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 often important that direct air distribution does not impinge on the

product. Cooling units are normally constructed of galvanized steel or non-ferrous material in order to reduce the corrosive effect of their constant wetted condition.

Cooling units are often called upon to operate in rooms where a temperature below freezing is maintained and low refrigerant temperatures are required. This results in the collection of frost on the heat transfer surface which in turn leads to a rapid loss in capacity and requires eventual defrosting. Such defrosting is accomplished by the following methods:

1. When the room is above freezing the source of refrigeration is cut off and the fan allowed to operate until the unit has defrosted.
2. A reversal of the refrigeration system may be provided and the so-called hot gas defrosting method used. This is accomplished by reversing the flow of the hot

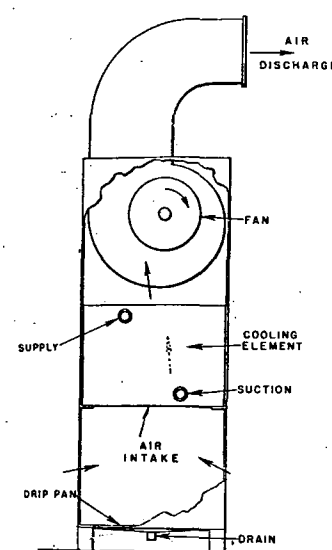


FIG. 10. SURFACE TYPE COOLING UNIT

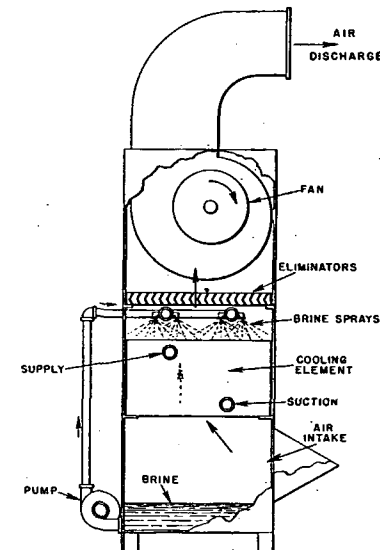


FIG. 11. BRINE SPRAY TYPE COOLING UNIT

gas so that it is delivered directly from the compressor to the evaporator of the cooling unit. As soon as the ice and frost has been melted, the system is again returned to its normal cycle.

3. Where brine is used as a refrigerant, heated brine may be sent through the cooler to remove the ice.

4. When the room is at very low temperatures, warm air defrosting is sometimes used by providing for the admission and removal of warm air from outside the cooled space.

5. The surface may be sprayed with a strong brine solution.

In order to prevent the collection of frost in low temperature rooms where high latent heat loads are present, unit coolers equipped with a constant brine spray are frequently used. These are normally of the housed fan type similar to Fig. 10, but equipped with a pump for recircu-