possible with the air handled. Provision is made for the removal of the moisture as rapidly as it is formed from the melting of the ice. Ice is also used to cool water which is circulated through the sprays.

Other methods of dehumidification accomplished by direct contact with the transfer medium are by means of the so-called *adsorption* and *absorption* systems. (See Chapter 23.) It must be recognized that these methods of dehumidification do not in themselves provide cooling. The substance removes the water vapor from the air thereby heating it. This highly dehumidified air may then be cooled either by partial rehumidification or by direct contact with a cooling medium of cold water or direct expansion refrigerant.

Filtering

The filtering or air cleaning function of an air conditioning unit is accomplished in a variety of ways depending upon the amount of filtering required. In unit systems where filtering alone is considered satisfactory,

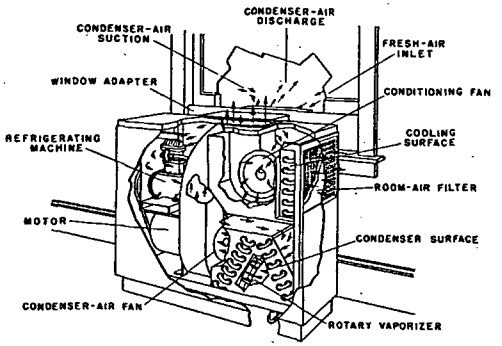

FIG. 1. SELF-CONTAINED ROOM TYPE AIR CONDITIONING UNIT FOR COOLING

the degree of filtering varies widely and in proportion to the actual needs. If the air is chiefly recirculated with but little outside air used for ventilation, filtering requirements are largely limited to keeping the coils in a clean and operable condition. Thus such units are frequently furnished with simple lint screens of low resistance and formed of moderately close meshed wire. Where outside air is used for ventilation, more complete filtering of dust particles is necessary and for this purpose, there are a large number of filters available on the market. Some of these filters are of the so-called *throw-away* type, constructed of inexpensive material so that when they become dirty or clogged they may be thrown away and replaced with new ones. All of these filtering methods are described in detail in Chapter 28.

Ventilating

The ventilating function or introduction of outdoor air is an important consideration in air conditioning units for comfort cooling. While a unit that recirculates all its air capacity is still considered an air conditioning

unit, the better type system provides for the introduction of a certain proportion of outdoor air. In some instances one of several units may operate entirely on outside air, while in other cases only a portion of the air handled by the unit is drawn from out-of-doors. In such cases a damper is provided either in the unit or in the duct connections for controlling the proportion of outdoor air.

Types of Units

Several types and designs of air conditioning units are available for selection. New designs are constantly appearing, with new improvements, greater capacities, wider range of application, and superior construction. Air conditioning units may be classified into the following types:

1. Self-contained air conditioning units.
   a. Room air conditioners for mounting either on the floor or window sill. The condensers are either air, water, or evaporatively cooled.
   b. Store air conditioners for mounting either inside the conditioned space and discharging air directly from the unit, or located outside the conditioned space with ducts connected to the unit. The condensers in this type of unit are water cooled.

2. Remote air conditioning units. These may be either the suspended type or floor type. Design of the floor type of unit varies depending upon the type of application. Units for multiple installation in office buildings or hotels, units for individual offices, and commercial refrigeration units are some of the varieties manufactured.

The self-contained room air conditioning units are finished in decorative cabinets to harmonize with the interiors of residences or offices. For the operation of this unit it is only necessary that it be located adjacent to a window or shaft to which air connections can be made and to plug in the motors to a convenient light socket. A unit of this type is illustrated in Fig. 1. In this particular unit, the conditioned air enters on the side, passing through a grille, filter, and cooling coil, and is delivered vertically to the room through a special motor and fan assembly. Refrigeration is furnished by a reciprocating compressor driven from a motor located in the base. This compressor utilizes an air cooled condenser. Air is drawn into the base by a fan mounted on the compressor motor, so arranged that the air passes through the refrigeration condenser and is again discharged out through the window connection. A novel feature of this design is that the condensate from the cooling coil is sprayed over the condenser surface and there vaporized, thus eliminating the need for drain connections. One advantage of this type of conditioning unit is that it may be removed from the occupied space during the winter season when cooling is not needed.

Other self-contained room air conditioners are available with water cooled or evaporatively cooled condensers. In the water cooled unit, a water connection and drain must be made to the unit, thus reducing the mobility of the unit. The evaporative cooled condenser model also requires a small water connection to supply the necessary water to evaporatively cool the condenser.

Self-contained room air conditioners have been made in sizes from ⅓ to 1½ hp. The ⅓ and ½ hp sizes are usually window type units with air cooled condensers.