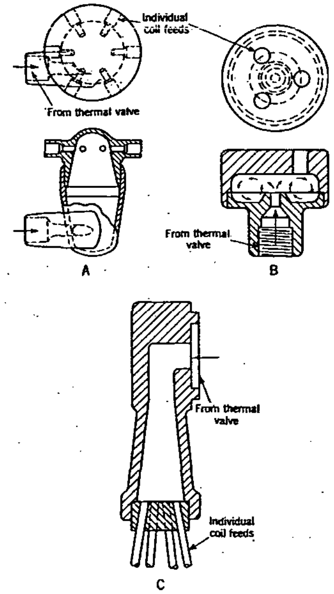

Fig. 5 . . . . Refrigerant Feed Distributing Heads

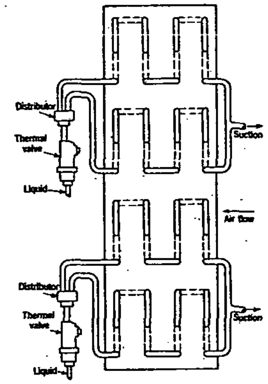

Fig. 6 . . . . Arrangement for Face Control

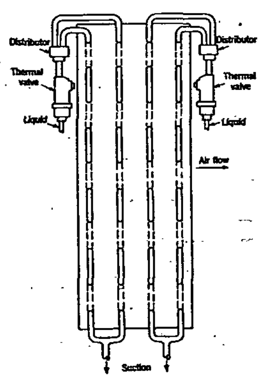

Fig. 7 . . . . Arrangement for Depth Control

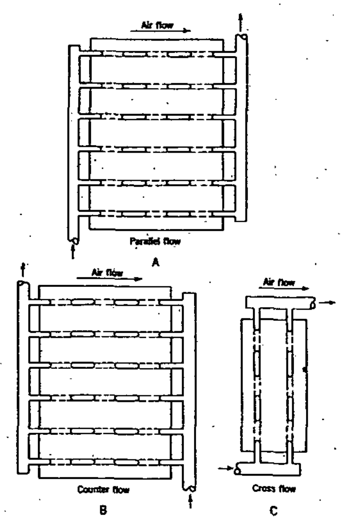

Fig. 8 . . . . Flow of Media in Tubes in Relation to Air Flow

heating coils, the temperature within the tubes being substantially uniform, and the mean temperature difference the same whatever the direction of flow, relative to the air. The parallel and counter-flow arrangements as illustrated in Figs. 8A and 8B are common in brine or water coils, with the counter-flow arrangement being the preferred arrangement to secure the advantage of highest possible mean temperature difference. Most direct-expansion coils also follow the general scheme of counter flow but the circuiting requirements for proper loading sometimes result in a combination of the other flow arrangements with counter flow in the same coil. Cross flow is generally avoided in the volatile refrigerant coils because of the unequal loading of the parallel circuits.

Applications

Heating coils in field-assembled banks are used for a number of purposes as described in Chapter 19. They may be arranged with the air flow vertical or horizontal, although the latter is more common. For steam heating, the coils may be set with the tubes vertical or horizontal. In the latter case the coil should be sloped to provide for condensate drainage. Because of the multi-circuit feed arrangement and the necessity for avoiding air and water pockets, water heating coils are generally arranged with the tubes horizontal. Certain precautions must be taken against freezing. Where steam coils are used with entering air below freezing temperature, throttling the steam supply may cause freezing of the condensate in the bottom of the coil, if the tubes are of the variety not provided with internal distributing pipes or an equivalent arrangement.

Some coils have inner distributing tubes, and also have supply and return headers cast in one piece. In this type of coil the condensate that forms in the outer tube has resulted from steam fed from the inner tube orifices. This condensate flowing back along the warm inner tube is prevented from freezing. A wide range of modulation at very low temperatures without danger of freezing, is therefore obtained. As an added precaution, with both steam and water coils, the outdoor air inlet dampers are often closed automatically when the fan is stopped to avoid trouble caused by very cold outdoor air drifting in during *off* periods.

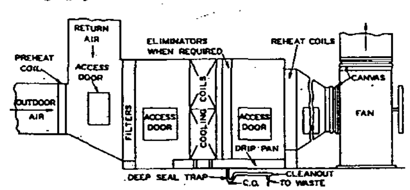

Fig. 9 . . . . Typical Arrangement of Cooling Coils in a Central System

A typical arrangement of coils is shown in Fig. 9. All of the air should be filtered to prevent dirt, insects, and foreign matter from accumulating on the coils. The cooling coil and humidifier must be provided with a drip pan to catch the condensate formed during the cooling cycle and the excess water from the humidifier. The drain connection should be on the downstream side of the coils, made of ample size (not less than 1¼-in. pipe), provided with accessible clean-outs, a deep-seal trap, and discharge to an indirect waste or storm sewer, so that there will be no possibility that sewer gas may enter the system. Precautions against freezing must be taken with the humidifier piping and drain connections as well as with steam or water coils.

Face and bypass dampers have proven to be satisfactory means of capacity reduction for cooling coils using non-volatile refrigerants. The use of such face and bypass damper

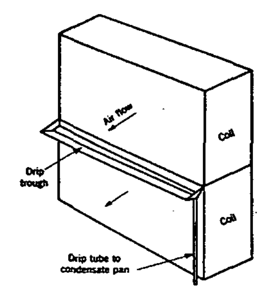

Fig. 10 . . . . Coil Arranged with Drip Trough

arrangements on volatile refrigerant coils poses difficult refrigerant control problems which are most severe when a change of setting at the thermostat imposes a rapid change in the dampers at the coils. On many installations, the coil bank is divided into 2, 3, or 4 sections and each section is connected to an individual compressor, or connected to a modulating compressor or compressors which will adjust to the load as each succeeding coil section is cut out by the thermostat.

The design features of the coil (fin spacing and type of fins, whether circular fins or plate) determine at what air velocity condensed moisture will be blown off the coil. Water blows off some coils below 400 fpm *face* velocity, while this does not occur on others at *face* velocities in excess of 500 fpm. Where there is a likelihood of water being blown off the coil face, eliminator plates should be placed on the downstream side of the coil. Plate coils are most frequently installed without eliminator plates. When a number of coil sections are stacked one above another, there is a tendency for the condensate to be carried out into the air stream as it drips from one coil to the next one. In such cases, drip troughs as shown in Fig. 10 are used to collect the water and conduct it to the drain pan.

The enclosure around a coil or filter bank should be corrosion resistant and should have adequate access doors to provide for changing of air filters, cleaning of coils, adjusting expansion valves, oiling motors, etc.

Sometimes cooling and dehumidifying coils are sprayed with water to increase the rate of heat transfer and to provide outlet air approaching saturation. This arrangement requires a collecting tank and recirculating pump to maintain water circulation whenever the apparatus is in operation. Fig. 11 illustrates this arrangement with a bypass around the coil. This bypass is often used to facilitate