coil F is required to warm the air to a temperature above freezing. Usually, the heat is supplied by means of hot water or steam. During many hours of most days it is practicable to recirculate enough of the air so that the air drawn from outside, after mixing with the relatively warm return air, will not be cold enough to freeze the water in the humidifier.

Upon leaving the tempering coil, the air enters the humidifier G. This may be a spray of warmed water, circulated by a small pump from a water tank under the spray chamber, or may be other means of supplying water vapor. The supply of moisture must be under automatic and very reliable control. Following the humidifier a heater I is required, for controlling the temperature of the air entering the supply fan.

The second group of heat transfer devices in a year-round system includes an air cooling component H, for use in warm weather. Its surface may be chilled by direct expansion of an approved refrigerant within

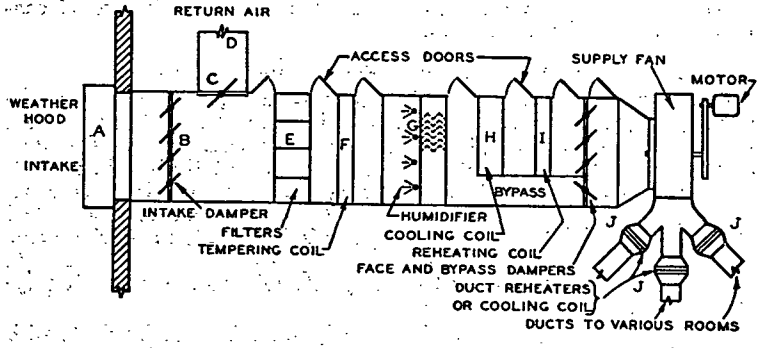

FIG. 1. ARRANGEMENT OF EQUIPMENT FOR YEAR-ROUND AIR SUPPLY SYSTEM

its tubes, or the surface may be cooled by a pump-circulated liquid such as water or brine. This device must be sufficiently cold to cool the summer air to a temperature below the existing dew-point, and may be expected to be wetted constantly by the moisture condensed from the air. A water-tight drainage tank must be installed under the cooling coil and should extend for a distance toward the fan. Water should be drained by means of a trapped waste through a vented air-break. The second group of heat transfer devices also includes an air-heating component (reheater) similar to the tempering coil and capable of warming the chilled, saturated air leaving the cooling surface, to a temperature sufficiently high to prevent complaint of drafts, when the air is delivered into the rooms.

ZONING AND ZONE CONTROL

It is apparent that while an apparatus like that of Fig. 1 would be very desirable for any single room, since in that case the air could be delivered at optimum conditions, the cost of a complete individual system for each room and the space required for the equipment generally would be prohibitive. Economy is favored if the varying requirements of numerous rooms or zones can be simultaneously satisfied by air from a single central supply system.

Various methods are practicable for controlling the temperature, humidity and air movement in various rooms or zones. A measure of control is attainable merely by proportioning the flow of air to each room, though usually such control by throttling dampers is difficult to maintain and should be avoided when possible.

Another scheme is to install a properly proportioned coil in the branch air supply duct serving each room to warm the air to suit the individual need. The air, for example, leaving the fan that serves several rooms, may be cooled before entering the fan, to the condition favorable for one room, and the air for each other room may be reheated by the branch duct coil to the required temperature. It is also possible to circulate a heat absorbing medium in the branch duct coils to reduce the temperature of the air passing to rooms that would be overheated if they received air at the condition leaving the central air supply system. In Fig. 1 such coils J are indicated in the three branch ducts leaving the supply fan.

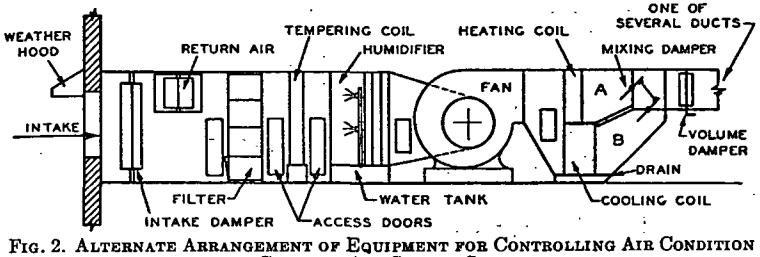

FIG. 2. ALTERNATE ARRANGEMENT OF EQUIPMENT FOR CONTROLLING AIR CONDITION IN CENTRAL AIR SUPPLY SYSTEM

When heat transfer devices are placed in branch ducts for improved temperature control, mechanically circulated water gives excellent results as a heat carrier. The water usually is warmer than the air but it is possible to use water colder than the air.

It is practicable also to use single central air conditioning equipment similar to that shown in Fig. 1, in conjunction with several fans; one for each room or zone. In such cases there may be a separate reheater on the suction side of each relatively small supply fan.

The designer must remember that the various supply fans will compete with each other for air, against the resistance interposed by the filters, coils, etc., that are used in common under such circumstances, and that, therefore, unless the fans are of backward-curved blade, non-overloading type, they may alternate in carrying more than their share of the air, and thereby cause the air distribution to be chaotic and unsatisfactory.

Another method of controlling temperature in various rooms served by a central air supply system is shown in the sectional elevation, Fig. 2. The supply fan is placed immediately after the humidifier. When cooling the air in hot weather, the humidifier is not operated. The fan will deliver the air through the heating coil and through the cooling coil to the two air pressure chambers A and B at the right of these coils. From these chambers many separate ducts, one of which is shown, each with a double-blade mixing damper, may convey the air to the various rooms. The mixing dampers, one of which is shown, are interlocked so that as the