

days but is unsatisfactory during the major portion of the cooling season because low humidities cannot be obtained at the more moderate temperatures.

The greatest menace of the conditioning system is over-cooling. In many instances, particularly in theatres, this has been done deliberately to emphasize the possession of a cooling system. Frequently it has been the result of ignorance of the fact that the desirable indoor temperature in summer is a function of outside atmospheric conditions. (See Table 2, Chapter 5).

In crowded spaces the heat to be absorbed will vary almost directly with the number of people present. As this number is reduced the cooling capacity of the system becomes more and more excessive and must be reduced without raising the absolute humidity. Systems of air distribution do not function satisfactorily at reduced capacity because of the spillage of cold air delivered from outlets at unusually low velocities. For good operation and automatic regulation some means must be provided for reheating to offset the reduced cooling requirements.

AIR CONDITIONING EQUIPMENT

Air conditioning equipment comprises:

1. Apparatus for providing the necessary heat and moisture exchanges within the room to be conditioned and of the air supplied to the room for ventilation.
2. Automatic devices for governing such apparatus so that temperature and humidity may be controlled within the limits desired. The latter are referred to as controls. Those for controlling temperature are known as thermostats, and those for controlling humidity are known variously as hygrometers, psychrometers, or humidostats.

Apparatus for effecting humidity changes may be divided into two distinct groups:

1. The humidifiers used for the purpose of increasing the moisture content of the air and to produce cooling by evaporation.
2. The dehumidifiers used for the removal of moisture from the air and to produce cooling by contact with water or surfaces at a lower temperature than the air.

Systems of Humidification

Humidifiers may be divided into the following general types, according to the method of operation:

1. *Indirect:* Introduction of moistened air.
2. *Direct:* Spraying into the room.
3. *Combined:* Direct and indirect.

Before the advent of modern air conditioning the direct humidifiers were largely used for increasing the humidity in cotton mills and similar places. There has been much improvement in this type of humidifier and it still finds wide application, especially in the textile mill industry.

One of these types uses atomizer heads in which the water is drawn into the nozzle and then finally atomized by a small jet of air under high pressure. This type is illustrated in Fig. 3.

In another type, water is supplied at high pressure (usually about 200 lb. per square inch) to an atomizing nozzle. This nozzle is located in a sheet metal enclosure, suspended from the ceiling, through which a current of air is caused to pass, either by the action of a motor-driven disc fan or by the induction action of the spray itself. The heavier particles of water are separated by a simple method of baffling and only the very finest particles are caused to pass into the room, with the current of air, where they are rapidly evaporated. This type is illustrated in Fig. 4.

In a third type of direct humidifying head a small jet of water is thrown upon a disc rotating at high velocity within a stationary circular comb

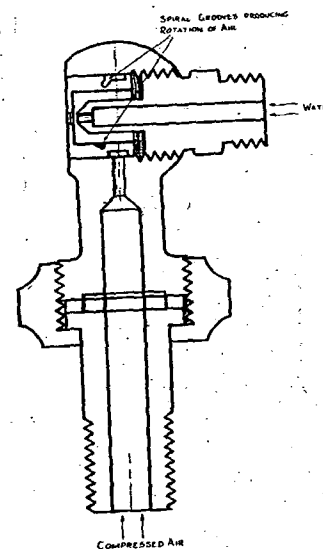


FIG. 3. DIRECT TYPE HUMIDIFIER HEAD

which consists of fine metal strips or teeth, against which the water thrown from the disc impinges. The finely atomized particles of water are carried out with the current of air created by a disc fan operated from the motor shaft. This type is illustrated in Fig. 5.

The three types of direct humidifiers described are suitable only for application in certain types of industrial plants and do not provide either for controlled ventilation or for dehumidification. These two provisions are essential in many industries and for installations providing for human comfort.

Indirect humidifiers are similar in operation to spray-type air washers, except that the water is sprayed directly against the current of incoming air. Such humidifiers comprise a chamber usually 10 ft. or more in length,