

sub-basement, second, sixth, seventh, eighth and penthouse floors. The seventh-floor fan room serves the primary-air system for hotel guest rooms.

A cooling tower on the roof provides condensing service for circulating cooling water to the centrifugal compressor condensers. This tower can cool 4500 gpm of water from 95 to 85 F at a peak outside wet bulb of 78 F. It is a twin cell, induced-draft unit of all-steel construction with double-deck spray heads—one bank with and one opposed to the air stream.

Three 2250-gpm pumps, including one standby, located in the sub-basement deliver at a 130-ft head, circulating water to the tower.

Fan Rooms. Conventional air-conditioning apparatus in fan rooms include (1) centrifugal-type fans, both single and double inlet (2) steam preheater and reheater coils (3) spray-coil dehumidifiers (4) electrostatic air filters.

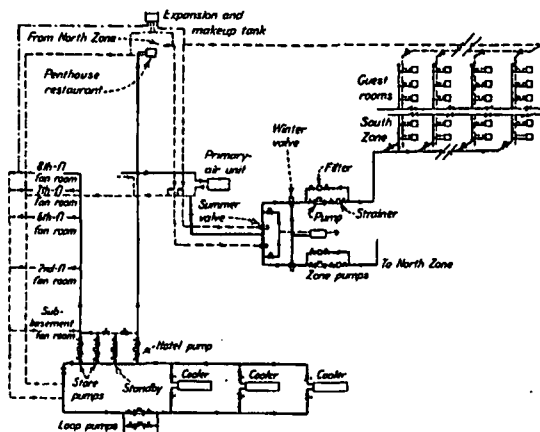
Four separate systems, employing a positive combination return and exhaust fan in addition to a supply fan, operate from a typical fan room. These combination return-and-exhaust fans balance supply air to the space and remove exhaust from toilets, etc. Air supplies for space needs include ventilation plus exhaust losses.

Ventilation presents somewhat of a problem. Usually additional air must be introduced to system circulation to make up for exfiltration losses. The vault-like construction of the windowless store changes the exfiltration factor considerably. The balanced combination return and exhaust fans furnish a solution to this situation.

The typical fan room acts as an exhaust plenum since the four positive return-exhaust fans spill excess air there. Propeller-type fans in the south wall draw this excess air out.

Filtering Air. All air passes through filters. A system of auxiliary return-air dampers reintroduces some return air to a portion of the electrostatic filters. The amount of dual duty these filters serve depends upon the amount of ventilation. Savings in both space and money result from this ability to set up a dual-duty service.

Controls for all systems operating from a typical main fan room are pneumatic. Every effort was made to reduce these controls to their simplest form. For instance, positive-acting dampers operate in all cases except for space-temperature control. In this service, face-and-bypass dampers are used. The positive-acting damper gives an almost constant air flow, which eliminates the need for static pressure regu-



3 Chilled-water flow diagram shows main loop acting as supply source for hotel and store pump loads. Cross piping enables standby pump to serve either load

lation used on modulating dampers.

Carrying out this simplification idea further, no 3-way valves have been put in the chilled-water circuit at the spray-coil dehumidifiers. Instead, a balance for a water flow to meet peak load was set in the field and is held constant by lubricated plug cocks. This holds the hydraulic system constant.

A manual-control arrangement in the basement regulates chilled-water temperature on a schedule based on outside wet-bulb temperatures. As the wet bulb increases, water temperature lowers, and vice versa. This results in an approximate dewpoint sufficiently accurate for summer-humidity control. Practically all thermostats have been located in the fan rooms rather than in occupied areas. This makes controls more accessible to the operator and less so to the tenant since it is felt that better over-all operation results.

Store Controls. Control system for store space includes: (1) return-air thermostat for operation of dampers (face and bypass) and steam reheater coil in sequence (2) thermostat on dehumidifier leaving side to modulate steam preheaters for a dewpoint of about 40 F (3) return air hygrosat for maintaining winter-humidity limit at 35% by controlling recirculating spray pumps (4) safety thermostat next to the dewpoint thermostat, set at 38 F to shut down the supply fan in case of steam preheater failure and

keep the water coil from freezing (5) pressure electric switches to start return-air fans, propeller-type exhaust fans and electrostatic filters when the supply fan starts.

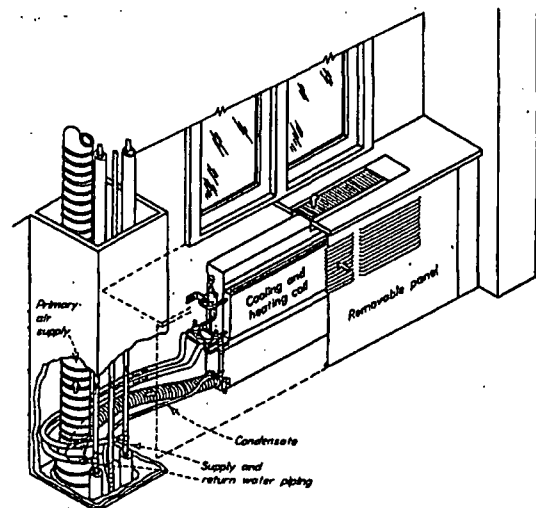
The return-air thermostat with a fall in temperature causes the face damper to close to its minimum position after which the reheater valve opens. A rise in temperature brings about the reverse. This cycle works both winter and summer. Sprayed coils make the dehumidifiers a cooling source whether or not chilled water is circulating through the coils.

Guest Rooms. A 3-element conduit setup supplies air conditioning for guest rooms. These elements are a primary-air system, a water-circulating arrangement and an outlet unit under the windows in each guest room.

The primary-air system originates in the seventh-floor fan room. It has two separate zone fans, north and south. This apparatus provides the necessary outside air for ventilation treated according to season—humidified in winter, dehumidified in summer.

Conditioned outside air goes through a series of round headers, which distribute it to the perimeter of the building. Risers in the center of each bay take it up the building. A typical riser serves two units per floor by means of branch runouts, which deliver primary air to the unit base.

Two zone pumps—one each for north



4 Special guest-room window units receive hot or cold modulated water from pumps under action of 3-way pneumatic valves actuated by outside zone thermostats

and south—feed hot or cold water to the coils of the window units, Fig. 4, in accordance with summer-cooling or winter-heating demands. Both cycles use modulated water temperatures in accordance with exposure demand by means of 3-way pneumatic control

valves, actuated by outside-zone thermostats. These outside-zone thermostats automatically position summer and winter 3-way valves to give required cooling or heating. Such a control regulates water temperature to windows in a zone in keeping with the actual re-

quirements of exposure as they develop.

A manual control on the unit in each room permits the occupant to regulate water flow through that particular coil. Primary-air flow across these coils issues from high-velocity jets in the mixing stack. The action of the jets sets up an induced draft that pulls room air across the coils at a volume of about three times that from the jets themselves. Both streams—air-jet-propelled primary air plus induced room air—mix and discharge through the grille in the window stool.

Chief advantages of the hotel-room system described are: (1) Each room is independent. No return air circulates so odors are not recirculated. Outside air from the room unit exhausts through the bathroom, thus isolating the room. (2) Air circulation stays constant despite load fluctuation. Water-flow changes meet these load variations. So a constant pattern of air distribution, as well as adequate ventilation, results. (3) Guest can regulate temperature to suit his own taste. (4) Absence of horizontal ducts with a vertical distribution system made possible 9-ft 9-in. floor-to-floor rooms to give one additional floor within the limits established by the building zone ordinance.

Hotel corridors have a separate conventional supply and exhaust system for the small amount of cooling and ventilation they need.

PRINCIPAL REFRIGERATION AND AIR-CONDITIONING EQUIPMENT

Terrace Plaza Hotel of Cincinnati, Ohio

REFRIGERATION EQUIPMENT, AUXILIARIES

Centrifugal compressors.....Carrier Corp
3 (700, 350 and 350 tons) motor driven through gear reducers
Compressor motors.....Crocker-Wheeler Elec Mfg Co
3 (700, 600 and 350 hp) wound motor, 1750 rpm, 208 v, 3 phase, 60 cycle
Gear reducers.....Palk Corp
3 (700 hp, 1750 to 2938 rpm; 600 hp, 1775 to 4959 rpm; 350 hp, 1770 to 6278 rpm)
Motor starters.....Cutler-Hammer, Inc
31 drum controllers, 3 balanced points
Pumps, 8, 1200 gpm, 60-ft head, 25-hp motors.....Peerless Pump Div
One acts as standby serving 12-in. loop; chilled-water service
Pumps, 4, 800 gpm, 60-ft head, 23-hp motors.....Peerless Pump Div
2 serve stores, 1 the hotel, 1 standby; chilled-water service
Piping.....Carrier Corp
12-in. main chilled water loop; 10-in. stores supply and return;
8-in. hotel supply and return—all chilled-water service
Valves, chilled-water service.....Wm Powell Co
Pumps, 2, Weathermaster.....Peerless Pump Div
North zone: 250 gpm, 60-ft head, 7½-hp motor. South zone: 315 gpm, 75-ft head, 10-hp motor
Pumps, 3, condensing water.....Peerless Pump Div
1250 gpm, 120-ft head, 100-hp motor. One acts as standby
Cooling tower, 1, condensing water.....Marley Co, Inc
Induced draft, all steel, 4500 gph

FANS

Air-conditioning service.....Buffalo Forge Co
Positive return-exhaust centrifugal type, 15; total 238,000 cfm;
4 double inlet, 11 single inlet
Supply centrifugal type, 16; total 381,500 cfm, 8 double inlet,
8 single inlet

Supply fans, Weathermaster, 3; total 20,144 cfm—high-speed centrifugal heavy duty
Split-duty propeller exhaust, 8; total 60,700 cfm
Ventilation fans.....Buffalo Forge Co
Supply—centrifugal type, 9; total 111,800 cfm, single inlet
Exhaust—centrifugal type, 29; total 244,920 cfm, single inlet
Supply and exhaust—propeller type, 4; total 18,000 cfm

DEHUMIDIFIERS, HEATERS AND AUXILIARIES

Dehumidifiers.....Carrier Corp
38; Type 26 R spray coil dehumidifier with 6-row 6-span cells, total 276,000 cfm dehumidified air
Steam coils.....Aerobin Corp
Steam preheaters—distributing-tube Type P, 49
Steam reheaters—distributing-tube Type P, 37
Unit heaters.....Carrier Corp
Centrifugal-fan type, 18; propeller-fan type, 8
Dollers.....Babcock & Wilcox Co
3; 200 psi, 30,000 lb per hr, gas or oil fired
Electrostatic-type filters.....American Air Filter Co, Inc
18, total 618,000 cfm
Multipanel oil filters—traveling-screen type, 3, total 60,600 cfm
Banks of Thruway-type filters.....American Air Filter Co, Inc
9, total 34,000 cfm
Thermostats.....Johnson Service Co
81; 16 dewpoint type in apparatus, 21 duct type in return air
44 room type
Hygrostats.....Johnson Service Co
13; 11 duct type in return air, 4 room type
Radiant heating—Dormet Room.....E J Nolan Corp
1700 literal ft of ½-in. welded pipe with 458 sq ft of surface

CONSULTING ENGINEERS

Heating, ventilating, air conditioning.....Jaros, Baum & Bolles