

supply  $4.4 - .553 = 3.847$  grains of water with each cubic foot of air making a total of about 110 lbs. of water per hour or about 13 gals. per hour.

This moisture is supplied automatically, the amount being controlled by the temperature of the spray chamber. Leaving the spray chamber we have a saturated mixture of air and vapour no matter how dry the entering air. At  $56^{\circ}$  and 100 per cent humidity each cubic foot carries 4 grains of moisture, which, as we have already seen is approximately the amount required.

When the apparatus is both to heat and ventilate a building there will be the same arrangement as before up to the inlet of the fan, and beyond the outlet other coils are placed to raise the temperature from  $65^{\circ}$  to  $85^{\circ}$ . A passage is left below these coils so that there are two ducts, one carrying the air at  $85^{\circ}$ , the other air at  $65^{\circ}$ . This arrangement is shown in figure II, and the ducts are marked hot air and cool air. These ducts are kept separate until the mixing dampers are reached, which are placed in both ducts joined together by a rod so that one will operate with the other. They are so placed, however, that when the damper from the hot air duct is closed the damper from the tempered air duct is open, and vice-versa. These dampers are operated from the rooms either by a chain pull marked, "open" and "shut," or by thermostats to give automatic temperature regulation. The illustration shows the dampers operating by thermostats. The duct beyond the damper marked "mixed air" is carried to the room from which the damper is controlled. When the room is warm enough the hot air damper is closed, and all the air enters at  $65^{\circ}$ . If too cold, part of the air enters from the warm air duct, both being half open. If still cold the warm air duct is open wide and air enters at about  $85^{\circ}$ . It will be seen that a certain volume of fresh air is thus supplied at a temperature varying to suit the demands.

The advantages of such a system are first, all of the heating apparatus is placed in the basement in charge of the janitor; second, a more even temperature may be maintained in the rooms; third, ventilation is supplied in positive quantities; fourth, humidity is kept constant and the air is well moistened; fifth, repairs are seldom required, and when needed do not necessitate expensive destruction and replacement of plaster, woodwork and flooring.

The disadvantages are, first, that power is required to run the fan; second, it must be designed and installed by engineers experienced in this class of work; third, space must be allowed for the apparatus and flues.