REFERENCES

[1] The engineering data were obtained from University of Illinois, *Engineering Experiment Station Bulletins* Nos. 141, 188, 189 and 246; Warm Air Furnaces and Heating Systems, by A. C. Willard, A. P. Kratz, V. S. Day, and S. Konzo. See also Manual 5: Gravity Code and Manual for the Design and Installation of Gravity Warm Air Heating Systems, Third Edition, 1947, published by the *National Warm Air Heating and Air Conditioning Association*.

[2] Simplified Procedure for Selecting Capacities of Duct Systems for Gravity Warm-Air Heating Plants, by A. P. Kratz and S. Konzo (*University of Illinois, Engineering Experiment Station Circular* 45, Dec., 1942).

[3] Gravity Code and Manual for the Design and Installation of Gravity Warm Air Heating Systems, Manual 5, Third Edition, 1947, *National Warm Air Heating and Air Conditioning Association*.

CHAPTER 19

MECHANICAL WARM AIR SYSTEMS

Air Distribution, Standard Combinations of Parts, Simplified Method of Design, Automatic Controls, Design Procedure for Large Systems, Adjustment of System for Continuous Air Circulation, Cooling Methods, Design of Cooling System

IN mechanical warm air or fan furnace heating systems[1], the air circulation is effected by motor-driven centrifugal fans, commonly referred to as blowers, instead of by the difference in weight between the heated air leaving the top of the casing and the cooled air entering the bottom, as in gravity systems described in Chapter 18. The advantages of mechanical systems, as compared with gravity systems, are:

1. The furnace need not be centrally located but may be placed in any part of the basement.
2. Basement distribution piping can be made smaller and can be so installed as to give full head room in all parts of the average basement, or be completely concealed from view where desired.
3. Circulation of air is positive, and in a properly designed system can be balanced in such a way as to give a greater uniformity of temperature distribution.
4. Humidity control is more readily attained.
5. The air may be cleaned by sprays or filters, or both.
6. The fan and duct equipment may be utilized for a complete cooling and dehumidifying system for summer, using either ice, mechanical refrigeration, or low temperature water for cooling and dehumidifying, or adsorbers for dehumidifying.
7. The use of the fan increases the volume of air which can be handled, thereby increasing the rate of heat extraction from a given amount of heating surface and insuring sufficient air volume to obtain proper distribution in a large room.
8. Ventilation air may be positively introduced and heated.

The construction features of mechanical warm air furnace units and discussions of the function and selection of the various parts, such as the furnace, casings, motors, filters and controls are included in Chapter 15.

AIR DISTRIBUTION

The conditions of comfort obtained in a room are influenced greatly by the type of register used and the locations of the supply registers and return grilles. In general it has been found that changes in the type, air velocity, and location of the supply register affect the room conditions much more than the changes in the location of the return grilles. One method is to locate the supply register near the floor, or high in the side wall, so that the warm air from the register *blankets* a cold wall, and mixes with the cold air descending from the exposed walls and glass. Another method is to locate the supply openings near the floor, or high in the side wall, on the inside wall and the return openings near the greatest outside exposure. In any case the warm air registers should be located so that the air stream never discharges directly into space that will normally be occupied by people at rest. Tests in the Warm Air Research Residence[2] have indicated that continuous blower operation gave better results than intermittent operation.