without opening the drafts, the same volume of heated air can be obtained as can be obtained by gravity at temperatures 60 to 80 deg. higher. If the same velocity could be produced by gravity as with the circulator at low temperatures, this device would be unnecessary. The only other way to accomplish corresponding results, would be to make the leaders large enough to convey the required volume at the low temperatures. In most cases this would be impracticable for lack of space, and besides, the efficiency of a furnace falls off so rapidly under such conditions that nothing like the same economy could be attained as with the circulator.

Some day circulators of some kind will be considered as necessary as any other part of a furnace plant. They will not be looked upon as something to fall back upon to make a defective plant acceptable, but they will be considered as an economical necessity, by means of which air can be circulated at more healthful temperatures, regardless of weather conditions.

The work done by Professor Willard and his staff at the University of Illinois, under the direction of the *National Warm Air Heating & Ventilating Association,* is a wonderful accomplishment. It means more to the future success of the furnace business than most of those who have had direction of this work fully realize. In the adoption of the code, herein referred to, a foundation has been laid for progress and improvement. As previously stated, the code is not perfect, but with a good foundation on which to build in the future, amendments can be made to correct and improve the code as progress and further knowledge seems to indicate.

Better furnaces will undoubtedly be designed, as they are certainly needed. None of the furnaces on the market are what would be considered a first-class design for a convector. Too much of the heat generated in a furnace is now wasted by radiation. There is no reason why a furnace cannot be designed which will show an efficiency ranging between 80 and 90 per cent. There is no furnace on the market today which will show better than about 60 per cent.

It is estimated that there are about 10,000,000 homes without furnaces in this country in climates where heat is necessary, and it is also estimated that 80 per cent, or 8,000,000, of these homes could be equipped with furnaces so that if this business could be developed it would amount to over two billion dollars, not including replacements. Thus one gets an idea of the importance of the work being done to standardize furnace practice. It has been further estimated that if those who have inefficient and ancient equipment could be induced to install modern furnaces it would be sufficient to keep the present industry busy for five years.

Owing to the poor success so frequently attending the installation of warm-air furnaces in homes of moderate size the furnace business has gradually gotten down to the stiffest kind of competition and about the only thing that recommends it to the average man is its low cost in comparison with steam or hot-water heat. Undoubtedly if it is put on a more scientific basis better installations will be the result and the public will gather confidence and will be willing to pay more money for a would gather confidence and would be willing to pay more money for a properly installed furnace, as it has many attractive features to recommend it. In some classes of buildings it is preferred to the complicated steam or hot-water systems and the expense necessary to install this type of apparatus.

GENERAL DATA SECTION

IN order to supply the demand for reliable practical data which might be considered as good practice for the design and construction of heating installations, this section has been added to the Guide. It has not been found practicable to include in this issue complete data covering every phase of the heating and ventilating art, but further data on various subjects will be compiled in subsequent issues.

The information here presented is the most reliable which it has been possible to obtain up to the time of going to press, and while it is not published as being absolutely accurate, in later issues this data will be revised and approved as being accurate, as rapidly as the Research Laboratory of the Society can complete investigations of the various Subjects.

The data herein contained were compiled from many different sources, and with the assistance and co-operation of many firms and individuals, who have given liberally of their time, their experience and their private data in order that this information might be made available to the industry at large. To all of these the *Guide Publication Committee* acknowledges its indebtedness and expresses its appreciation.