service at present in operation, though large hotels use these systems. However, the possibilities of such a system warrant a careful investigation of the project.

It has also been suggested that a hot water system might be supplied with cold water to cool the buildings during the intensely hot summer weather. Such results could be obtained by simply pumping cold water through the system if it were available or a system of refrigeration could be installed to artificially maintain the desired temperature. Such cooling service has been provided in some first-class hotels and in some theatres that run during the summer. Usually, however, the cooling of buildings is secured by passing the ventilating air through cold water sprays. While such cold water service as has been suggested would be welcomed by most people during the intensely hot summer weather, it is questionable whether this could be made profitable. It would be decidedly a luxury and not a necessity, as heat is in winter.

Ice-making plants have already been installed by several heating companies and many more are considering the advisability of such plants. These ice plants are run only during the summer season, and as they are usually of the absorption system, the exhaust steam is used which in winter goes to the heating system. As the electric load is frequently light during the summer months, in some cases compression machines have been installed. However, many decided improvements have been made of late years in the absorption system, and as exhaust steam can be readily used in it there is every probability that it will be used to a greater extent in the future than in the past.

Among the factors that should be considered when it is proposed to add an ice-making plant as an auxiliary to a central heating plant, the following should receive careful attention:—

1. The first cost and up-keep of the ice-making plant.
2. The probable demands for ice.
3. The competitive prices for ice.
4. The cost of making and delivering ice.
5. The power or exhaust steam available during the summer months for ice-making purposes.

A conservative estimate of the net profits to be derived from such an auxiliary plant is the real index that will show whether or not such installation is warranted.

Measuring and Charging for Central Station Service.—When central heating systems were first installed, charges for service were made by one of the following methods. At first, a fixed amount was charged the customer for the heating season equal to his average coal bill. This was unfair to the heating company, for it did not take into consideration the rising price of anthracite coal, the expense of removing ashes or the cleaning, repair and up-keep costs on the furnace used by the customer. This form of contract also encouraged the customer to minimize his former costs of coal. Besides this, customers usually practised strict economy in the use of heat from their own plants, but when this was supplied by a central station they were apt to be very wasteful. This last condition invariably occurs whenever charges are made on flat rates, and forms one of the strongest arguments against such systems of charging. A second system, which is still in use to a limited extent, provided for a fixed charge per unit of space heated. This method was often unjust, owing to the variation in the construction of the buildings heated, the height of ceilings, and use made of the building. A third method, which is still in use, consisted of a fixed charge per sq. ft. of radiation served. This system is not fundamentally correct, as it does not take into consideration the variation of heat demand with differences of glass and wall exposures, size of room, etc. However, if the radiators have been carefully designed for each room, the rates are, on the whole, very equitable. Such service should in every case be provided with thermostatic control, or otherwise the heat waste will be very great. While this method is still used to some extent with exhaust steam, it is used almost universally on hot water systems, for up to the present time no device has been placed on the market which will measure the heat supplied in hot water service. Such a meter is now being developed by Gebruder Sulzer at Winterthur, Switzerland, but has not yet been put on the American market. Some form of measured service is the best solution of the question of charges, both for the customer and for the company supplying heat.

The amount of heat supplied to a customer when exhaust steam is used can be determined by catching the condensation in a trap and discharging it through a hot water meter. The two meters of this type generally used are the "Simplex," made by the American District Steam Company, of Lockport, N.Y., and the "Detroit," made by the Central Station Steam Company, of Detroit, Mich. Other condensation meters of various types have been used and are being tried on heating systems with various degrees of success. All such instruments must be inspected periodically to see that bearings are not gummed up and stuck, that the dials are recording properly, that the spouts and nozzle are not choked up, and that the meter has not become out of level.

In some cases it is found desirable to measure the amount of steam supplied to a heating system, or, in the case of a large consumer, to measure the steam supply rather than the condensation. This can be done quite accurately by a steam flow meter. At the present time the type most widely used is that of the General Electric Company, Schenectady, N.Y. This meter is essentially a Pitot tube with either a mercury manometer or dial indicator or a special tilting device with a recording mechanism. Several tests have shown that these meters possess a high degree of accuracy for ordinary commercial work. Other steam flow meters that have been used include the Gebhardt, the St. John and the Sargent.

Water, either for boiler feed or for heating service, is most conveniently measured by the well-known Venturi meter, manufactured by the Builders Iron Foundry Company, of Providence, R.I. It is always provided with both an indicating dial and a recording dial of the circular chart type, and has an accuracy of within 2%. The Lea Water Flow Recorder, recently introduced into this country by the Yarnall-Waring Company, Philadelphia, Pa., is also used to measure and record the flow of fluids. In it the water passes over a V-notch and the quantity passing is recorded by means of a float and rack and pinion mechanism operating a pen on a paper chart driven by a clock. This apparatus cannot be used under pressure.

It will be noted that all condensation meters discharge to the sewer. This results in a certain loss of heat. When the supply of boiler feed water is bad, this loss of condensed steam is a serious matter and must be taken into consideration.

Probably the most important factor in the executive administration is the determination of equitable rates for service rendered. Rates, as already pointed out, should be based on the manufacturing cost of heat alone, independent of the financial benefits the company may derive