cost for current, apparently about 1.2 lbs per cubic foot of space per year, or if you calculate the cost for steam power the amount of coal that would be used for heating (if there was no engine or no exhaust steam used) should be credited to the cost of steam per horse power per year.

In a plant where the load is changeable such as a large office building, the ideal plan would be to buy electrical current for the summer months and use the engines in the plant during the colder weather using the exhaust steam for heating. In many cases this would cheapen in others it would not do so well. This largely depends upon the number of hours per day power is needed. It is claimed by many engineers that it is cheaper to use exhaust steam for heating than it is to use steam direct from a high pressure boiler through a reducing valve. In many large buildings that must be kept up to temperature all the time night and day the engines are run during nights and Sundays with rather a light load and the exhaust steam used for heating because tests have shown this is the most efficient of the two. Some engineers claim that the pulsations received from the engine exhaust materially assist the distribution of the heat throughout the system.

Steam at 100 lbs. gauge pressure contains 337.8°F. of sensible heat, while steam at 2½ lbs. gauge pressure contains 225.49°F. a difference of 112.31. In one case this difference is used up in useful mechanical work and in the other it is used up in non-productive internal work, forcing its particles through a very narrow opening in the reducing valve. The productive mechanical work is reduced by cylinder condensation and by the friction or power required to operate the engine itself without reference to the load it drives.

The designing engineers on this continent have much to learn about the use of steam in engine cylinders. This more especially applies to smaller plants. Take the most economical American engine of say 100 H.P. and the steam consumption will be from 26 to 30 lbs. per horse power per hour, while in Germany and France they succeed in doing this upon from 12 to 16 lbs. while if the engine is compound and condensing, a water consumption of from 7 to 9 lbs. has been obtained. This is mainly because superheated steam is used and cylinder losses are reduced to a minimum. The locomobil and the stumpf engines are built and sold under the above guarantees. We have many instances of smaller steam plants running continuously and showing good economy—to quote one or two of many, a plant having 1—12 in. × 12 in. × 300 R.P.M. Engine and 1—72 in. × 16 ft. horizontal tubular boiler, 1 feed water heater and two duplex boiler feed steam pumps—the factory contains 342580 cubic ft. of space to be heated, the load upon the engine averaged 80 H.P. for 10 hours per day, coal cost