[With the alove apparatus the effects produced by resistance, capacity, and self-induction, both separately and in combination, and also distributed, in the form of an artificial cable, were demonstrated at the discourse.] There still remains much work to be done in devising new methods of measurement, and in improving the present apparatus; nevertheless the existing methods and apparatus are already sufficiently perfect to enable a large number of investigations to be successfully undertaken.

If the necessarily brief reference to the complex problems of telephony and the résumé of the methods of measurement available to attack them which I have given tonight should inspire any of our engineers or scientists to undertake systematic quantitative measurements with a view to improving the transmission of sounds and speech, then this discourse will have accomplished its aim, and, I think, justified its title—"How to Improve Telephony."

XXX

AUTOMATIC REFRIGERATING MACHINERY.

The automatic system of refrigeration, as designed by the Automatic Refrigeration Co., Hartford, Conn., uses ammonia as the refrigerant. This is an entirely self-controlled system, regulation being effected by a sensitive laminated blade thermostat placed in the refrigerator. By this means a switch controlling the motor that drives the ammonia compressor is opened and closed, as may be required to keep the desired temperature in the cooling boxes; all other automatic devices being dependent upon the operation of the compressor. This system eliminates the cost of skilled attendants. It is made in small sizes, and thus enables persons operating small industries, where the services of a skilled engineer could not be afforded, to have their own refrigerating plant. The general view shown



Automatic Refrigerating Plant.

shows the motor, compressor and controlling device, also the interior of a cold storage compartment, in which can be seen the controlling thermostat, and the crisply frosted expansion pipes. By the use of this system a great saving of space is effected, the cooling coils occupying only about 2" of space on the walls of the boxes; ice bunkers are done away with, or converted into cooling boxes, resulting in a saving of about one-third the total space. There is also a natural circulation of air in the boxes, which reduces abnormal humidities and preserves the product in a much better condition than is possible with ice, and there is no accumulation of moisture and filth, such as result when ice is used.

x x x

WIND POWER ON BOARD SHIP.

Uncertainty in amount, and the variable speed of the motor itself, are the chief objections to wind power, and, therefore, wind power cannot be included as a resource in the great power situation, even on a small scale. It is probable that the wind may be relied upon in agricultural communities, but for power production on a large scale it cannot be considered important.

There is one place, however, where the windmill may be used to advantage, and this is on board sea-going sailing vessel, not equipped with steam or gasoline engines. The Howell Bilge Pump Company, of New York, are manufacturing a windmill and bilge pump for use on such vessels, and the first one to be installed was placed on the barge "Pacific," owned by P. Dougherty and Company, Baltimore, Md. Taking into consideration the cost of gasoline pumps, the windmill pump has the advantage, as the first cost is



only half, or even less than half the cost of the former. Again the windmill costs nothing to operate, and requires no attention, with the exception of lubrication. Another very desirable feature is the absence of vibration and noise which accompanies the gasoline engine, making it impossible for the officers or crew to obtain sleep where the engine is located near the sleeping quarters. With a windmill driven pump there is absolute safety, as there are no complicated parts to get out of order, and with a little care it will not need any repairs for years. The windmill illustrated is so arranged as to be self-trimming, and being fitted with a rudder, always remains head to the wind. It is so constructed, that if struck by a squall it will luff up into



the wind, and cease to revolve. By the use of the windmill bilge pump the danger which attends the use of gasoline is eliminated, and time spent in securing and storing same is saved. The smallest outfit made will raise 1,500 to 5,000 gallons per day, according to the velocity of the wind, and will operate with a four-mile breeze. The device is absolutely automatic, and will last as long as the vessel. The windmill bilge pump is intended for all classes of wooden sea-going vessels, but more particularly for lightships, sailing ships, barks, brigs, schooners, coal, lumber and oil barges, and for houseboats, canal boats and scows.

* * *

An engineer, with sleeves rolled up, happened to get his arm against the piston rod. He ran for the throttle, shut the engine down, and said to the chief: "The piston rod is hot."