diversion is comparatively small the fixed charges should be allowed on the cost of a portion of the large plant equivalent to the amount of power diverted. Thus, supposing 5 horse-power is diverted in a dry month, and the cost of the steam plant is $60 per horse-power. 5 × $60 = $300. $300 at 12 per cent. = $36. This capitalized at 5 per cent. = $720.

If this allowance is made the owner may increase the capacity of his plant by 5 horse-power when he renews it, and will have been recompensed for this expense.

If the interest charges are not included in the fixed charges, the cost of the plant, $300, should be added to the capitalized sum.

If the diversion is a comparatively large amount, it may be necessary to remodel and increase the existing steam plant, or to put in a new one. Allowance should be made in the same way for this.

Cost of Steam Power.

The cost of steam power usually has an important bearing upon the settlement of damages. The following Figs., 4, 5 and 6, have been prepared, which show the yearly cost of producing steam power under various conditions and cost of coal when running ten hours a day and six days a week with a fairly steady load. They are intended to show the expense of running under everyday conditions on such a plant as a prudent man would instal and run with ordinary skill.

Th cost of 24-hour power for 365 days a year is about 2.2 times the cost of 10-hour power for 308 days.

The cost of 24-hour variable load cannot be stated without knowing all the conditions.

Coal Consumption Used in Estimating Damages.

The coal consumption used in estimating damages when the power diverted must be made good under a varying load contingent upon the fluctuation of the water power, should be somewhat larger than the coal consumption for a fairly steady load. I have usually added about 20 per cent. to the coal consumption required for a steady load. The fluctuation of the water power will usually not be great for a single day, but the variation covers longer periods, as weeks or months.

Effect of Use of Steam for Other Purposes.

In many textile and other mills low-pressure steam and hot water can be used in the manufacturing processes, and for warming the buildings. The amount varies largely, in some cases being more than the equivalent amount of steam exhausted from an engine large enough to run the work, or to the amount of water required for condensing for an engine of the same size. Rarely ever in a textile mill would the amount fall below 20 per cent. of the total heat rejected by the engine. This has the effect of reducing the value of water power for such mills, and has the effect of reducing the damages as figured on straight power conditions.

It is never attempted, however, to estimate this effect in units for damages. It should be considered in estimating values, and it has its effect upon the selling value of water powers, making them of less value for industries having use for low-pressure steam and warm water.

All the varying conditions of different industries have an effect of producing a sort of average selling value for water powers, but each case requires examination and estimates of its own.

AN ELECTROLYTIC WIRELESS TELEGRAPH DETECTOR.

The De Forest Wireless Telegraph Co. has been making some record performances during the last few months. A short time ago we reported the sending of messages from St. Louis to Chicago, a distance of about 300 miles. More recently a powerful station has been opened at Kansas City in the hope of communicating with Chicago; and not only was this realized, but messages from the new station were picked up by the Cleveland station at a distance of 700 miles. This is a new record in overland transmission, and it is estimated that it is equivalent to transmission through about 1,400 miles over water. Experts of the company are jubilant over the progress made, and are looking for even greater achievements in the near future. A factor which is held to be in a large measure responsible for the recent success of the De Forest system is the adoption of the electrolytic detector. It is used exclusively now, and its advantages over the old magnetic detector are many, the chief probably being the possibility of tuning the receiver to the transmitter with satisfaction. This detector is described in a recent number of the Electrical World and Engineer by James E. Ives, Ph.D., of the De Forest Research Laboratory. His description is as follows:

In a paper read before the recent International Electrical Congress at St. Louis, Dr. Lee de Forest described a form of electrolytic oscillation detector used by the De Forest Wireless Telegraph Company.

This detector is an electrolytic cell, in which the anode is a very fine platinum wire dipping to a slight distance beneath the surface of the electrolyte, and the cathode is a heavier platinum wire immersed to a considerable distance.

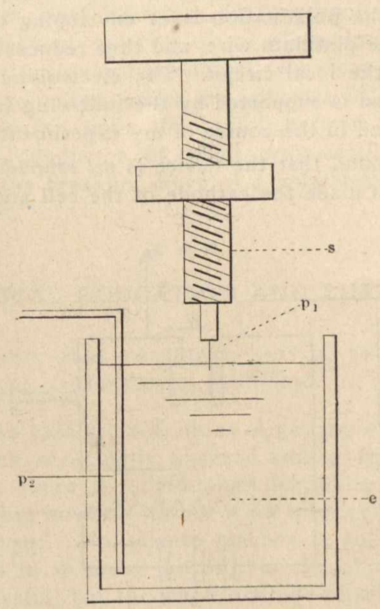

Fig. 1—Simple Form of Cell.

A simple form of such a cell is shown in Fig. 1, where *s* is an adjustable screw, *e*, the electrolyte, p_1, the very fine platinum wire, p_2, the heavier platinum wire.

Any aqueous solution may be used as the electrolyte, but solutions of the alkaline salts give the best results.

The distance to which the very fine platinum wire should be immersed depends upon its diameter. For a wire about 40 millionths of an inch in diameter, a depth of immersion of about 3 thousandths of an inch gives the best results. The greater the diameter of the wire, the smaller must be the depth of immersion. The fine platinum wire may have a diameter anywhere from a few millionths to a thousandth of an inch.

A diagram of the local circuit containing the detector, *D*, a telephone, *T*, potentiometer, *P*, and battery, *B*, is shown in Fig. 2. When receiving wireless telegraph signals one side of the detector may be connected to the aerial wire, *a*, and the other side to the earth wire. *e*. When a signal is received a musical sound is heard in the telephone, its pitch being that of the sending spark.

Dr. Lee de Forest, as already stated, holds that this device is electrolytic in its nature, and operates in virtue of the electrolytic action within it. Prof. Fessenden holds that it operates in virtue of heat generated in the electrolyte surrounding the immersed portion of the fine wire when a Hertzian oscillation passes through the detector. W. Schloemilch (*Elektrotechnische Zeitschrift*, November 19, 1903) is uncertain whether it operates in virtue of its polarization capacity or its ohmic resistance. M. Reich (*Physikalische Zeitschrift*, June 15, 1904) believes, as a result of his experiments, that it acts by the polarization of the small surface