principally where small amounts of power are required, such as to operate tools, drills, hoists, etc.

Simultaneously with the evolution of power transmission methods of transmitting power, by reason of their adaptations, electric progress has been very rapid, and electrical methods of transmitting power by reason of their adaptability and comparative freedom from limiting distances, has enabled it more or less to outshadow all competitors. Electric power transmission is equally feasible through a few feet or very many miles, although, of course, with somewhat unequal losses, and may small amount of energy or the enormous output of our great waterfalls, without difficulty, electrical transmission by reason of its good features has brought the stored energy of nature from waterfalls to industrial communities. It has likewise removed innumerable shafts, belts, etc., from our factories. So successful, indeed, has been the application of electrical apparatus to the transmission of power that among engineers it has come to be regarded as the best means of transmitting power.

But it is well to bear in mind that no matter how good a method or piece of apparatus may be, the history of all engineering progress seems to indicate that some time and somewhere a better one will be found, if not better for all applications, at least better for some. Engineering practice really consists in the process of differentiation, applying the principle that "what is best in one place or time will not necessarily be so in another, or that something new may always find a useful field if essentially good."

In the development of the natural gas fields in the United States, there were built very extensive pipe lines for transmitting gas to towns and cities to be used for lighting, heating, and power purposes. As the gas wells ran out and as the cities and towns were equipped with apparatus requiring natural gas, it appeared to be more economical to seek distant wells and transmit the gas, than to substitute for it anything else. Thus there has grown up in the natural gas fields long distance pipe lines for handling natural gas and for the sake of economy, transmission is effected at high pressure, this pressure being usually maintained by the gas engine-driven air compressors. What was primarily intended to be a convenience for postponing the inevitable has proved to be a practical method of transmitting power by the concentrated energy in the form of gas fuel in pipes.

Apart altogether from the economy of the gas engine for power purposes there are some points decidedly in favor of a pipe line for transmitting gas power. There is practically no danger of a break in a well-laid pipe line, whereas at the present time, there are constant interruptions and more or less danger in the case of overhead electric transmission lines carrying electric current of very high voltage and exposed to the vagaries of wind and weather. In the case of electric transmission systems, the rotary motion is converted into electric energy at the dynamo with a loss, transmitted over lines with another loss, and converted back into rotary motion at the motor with a still further loss. Furthermore, many manufacturing plants require heat and there are now available apparatus whereby the waste heat from the exhaust and cooling water can be utilized, further adding to the advantages and economy of the gas engine.

I have endeavored to present in this paper a calm statement regarding the present position and the possibilities of gas power, and to avoid making any extravagant claims for this excellent form of power, but if we are to have cheap power why not have the cheapest available? What would seem to the writer to be most required at the present time is hearty co-operation between the various gas companies and the manufacturers, so that the public and prospective users may be properly educated to the many advantages which accrue from the use of gas as a means of cheap power.

SOME METHODS OF MEASURING LIGHT.

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The measuring of light may be said to belong to one of the more important branches of physics. The sense of sight enables us to determine the difference between light and dark, and we can, with the aid of the eye, determine the difference of intensity between two or more sources of light: we can judge when one light is brighter than the other, yet our sense of sight is incapable of deciding with precision how many times one light is brighter than another.

The measuring of light is, therefore, in the first place dependent upon the sensitiveness of the eye, and this, together with the aid of proper instruments, we are able to determine (to a good degree of accuracy) the intensity of one light compared with that of another.

The measurement of light is based on various laws, the chief of which is that of the law of inverse squares. The intensity of light varies inversely as the square of the distance from the source of the light is the fundamental law of photometery. This law holds good for lights when placed in the horizontal, but when it is necessary to experiment with lights out of the horizontal, we have to use the general photometric law—$e = \frac{I \cos 6}{D2}$. Where "e" equals the light effect (to be ascertained in foot candles), equals I the power of the source of light multiplied by the cosine of the angle of incidence divided by the square of the distance from the screen.

When we speak of certain sources of light having a certain candle power, we mean that the source placed at a given distance from a surface illuminates that surface so many times more than does that of a candle placed at the same distance.

Many of you are familiar with the Bunsen method of ascertaining the relative value of artificial light. In his arrangement Bunsen invented and employed a screen or disc of paper greased over part of its surface so as to render it partially translucent. The disc was supported on an upright and the two lights were placed one on the one side and one on the other of the disc. The smaller light was then brought towards the disc until the disc was equally illuminated on both sides. The distance from the disc to the centre of the source of the light was then measured and squared, and the quotient obtained from the division of the one square with the other resulted in the relative illuminating power of the flames.

The Bunsen photometer, although a good instrument, has been greatly improved upon, with the result that not only more accurate measurements are obtained, but also the measurement of different colored lights (such as those given out from incandescent lamps and electric lights) can be made with accuracy.

In comparing and measuring the intensity of various lights one must of necessity have a standard to work to. It is to be regretted that there is no common standard of light. Various countries have various standards, and this prevents the result of work done in one from being compared (with accuracy) with that done in another. It will be of no avail to discuss the merits and demerits of the various standards of light used in different countries, and I will confine myself to the official standards of the English-speaking countries.

(To be concluded next week).