comparatively smooth and wavy, the alternations being "demarcated" by a neutral point smoothly and rapidly passed, rather than by an interval. A "curve of sines" represents it.

The outcome of our enquiry, therefore, seems to be this: that whilst it is clear that electric light circuits cannot be used for medical purposes without the strictest measures of precaution against the influx of strong currents, there is also good reason to suppose that efficient protection can be secured by the adoption of the above-indicated or other suitable methods.—*W. S. Hedley, M.D., in the London, Eng., Lancet.*

ELECTRICAL POSSIBILITIES.

THE amazingly rapid developments in the transmission of power by electricity make it difficult to imagine what may yet be accomplished in that line, as the wildest predictions of one year become the sober facts of the next. Some time since it was announced that Mr. Villard proposed to introduce electricity as a motive power on the Northern Pacific railway. Within the past few days a commission of experts, representing a number of railroad companies, made a tour of the principal electrical establishments in the country. A member of this commission, while in Pittsburgh, stated that many railroad managers throughout the country believe that the adoption of electricity as a motive power on the railroad is merely a question of a comparatively short time. Part of the cost of experiments in that direction is to be borne by the railroads, and it is the opinion of practical railroad men that the problem of using electricity in the transportation of heavy loads is much nearer a solution than is generally supposed.

Prof. Trowbridge in a recent magazine article, makes some very interesting propositions regarding electrical developments. He declares it as his belief that a diminution of our coal supply would result in making the transmission of power from Niagara Falls to New York a success. The fact that the storage batteries are becoming a commercial success leads him to the opinion that there is a possibility of employing them to convey a portion of the power of Niagara to Chicago. He then proceeds to examine the possibility of such a project and estimates that six horse power can be stored in a ton of material which constitutes the storage battery. The equivalent of fifty horse power could certainly be carried in one freight car, and it would therefore require 100 freight cars to transport 5000 horse power from Niagara Falls to Chicago. The cost of the batteries would be in the neighborhood of $2,000,000, and in order to maintain 5,000 horse power in Chicago relays of batteries would have to be employed. Against the expense of this method must be placed the cost of the high insulation of a line of 400 miles under a pressure of 20,000 volts. Prof. Trowbridge admits that under present conditions it would be more economical to generate the electricity at Chicago from coal by the ordinary method of employing a steam engine to drive a dynamo, but he holds that a great change in our coal supply would speedily turn attention to the immense waste of energy which is going on at Niagara Falls and might convert New York state into a bee hive of industries, and Chicago might then find its proposed experimental line of 400 miles of great value.

An important proposition in regard to the further use of electricity in railroading, comes from a correspondent of an electrical journal. He has a plan which he claims will, if adopted, prevent the railway collisions which so frequently horrify the public. The details of the plan, as given by him, are quite lengthy, but a glance over them shows that he proposes to attach a supplemental valve to the throttle-lever in the engine cab, by means of which steam is let into a small engine built on the locomotive and operating a dynamo connected with it. The arrangement is to be such that when steam is shut off from the large engine, it is admitted to the small one, setting the latter in motion, and thereby generating an electric current from the dynamo, which establishes a current with any other locomotive on the same block. The centre rail or wire, being divided into blocks of any desired length, the circuit of the dynamo is open so long as no other locomotive gets on the same block. When, however, a locomotive does pass on the same block, it carries a powerful magnet attached to the lever operating the air brake. This completes the dynamo circuit on the standing locomotive. By the current flowing up and through the throttle and brake magnets of the coming locomotive steam is shut off and the air brakes applied, so as to stop the swiftest train in time to prevent a collision. If this plan is practicable it will be classed among the greatest railroad improvements of the time, and it will doubtless be adopted by the companies as soon as possible.

But the most startling assertion as to the possibilities of electrical development comes from a German paper which has heretofore been regarded as a reliable journal. This paper in substance states that German experts have recently tested an electro-metallurgical process which is to effect a most complete revolution in the metal industry. This process is said to be such that the current generated by a dynamo driven by a small gas or petroleum engine will be capable of extracting day for day more metal than the largest blast furnace is able to produce. According to the statements this process effects a saving of 80 per cent. on present blast furnace methods. The inventor, as the story runs, first demanded £2,500,000 for his process, but he finally disposed of it to an international syndicate which will erect great works. The names of the inventor and his capitalist supporters are to be made known to the world as soon as the letters patent have been granted; until which time we can learn nothing more of a process which is pronounced an absurdity by the few metallurgists who have given it any attention. It is thought that a man with such a discovery, which included such boundless possibilities, would first protect himself by letters patent before making any announcement to the world.—*American Manufacturer.*

A SUBSTITUTE FOR PLATINUM.

A RESIDENT of Boston claims to have discovered, after long experiment with many discouraging results, a process whereby copper may be hardened sufficiently to render it of great value in the many uses to which its exceeding degree of softness has heretofore been the one great drawback.

This method is practically a resurrection of one of the ancient Greek arts, which, like many other valuable ideas, was lost with ancient Athens. The Indians had some knowledge of the art, and the Aztecs of Mexico made tools of copper which have been found in one of the old granite quarries in that country, and which were, it is supposed, sufficiently hardened to use on stone work.

The inventor states that the idea of hardening copper first occurred to him while looking out of a window and observing the effect of its own weight upon the street railway wires. He noticed that they would, after a time, begin to sag and would have to be tightened, and finally, after repeated stretching, they would become so weakened as to break. But the principle of the thing was discovered while he was experimenting upon another matter, that of finding a substitute for platinum, and in which, by the way, he has partially succeeded.

But to return to our original subject, samples of treated copper were shown the writer. They were in the form of small buttons, but neither a knife or file had any effect upon them. A small sheet about one-eighth of an inch in thickness, which had been sliced off an ingot, was produced, and notwithstanding the fact that it was cracked from the circumference nearly to the centre in two or three places, it was impossible either to break or bend it with the hands. It is claimed that a bridge made from this hardened copper will last for ever, provided the foundation remained intact, and that it is absolutely proof against weakening by corrosion. The cost of the treated copper will be a little in advance of the ordinary article, something like 15 cents a pound more, but if found practical in all that is claimed for it, this will be but a small item.

Of course the process by which the metal is hardened is kept secret, but the inventor states that it is treated while smelting and not in form.

The substitute for platinum mentioned above is intended particularly for use in the manufacture of the incandescent electric light bulb. This article was shown in form and in a pulverized state. It is black and of a dull hue. Its chemical analysis and specific gravity are the same as of platinum, it being 17.6 times heavier than water, and all that remains is to render it conditionable to draw, and by its use the bulk will be reduced in cost about 87½ per cent., to say nothing of the other uses for which it might be perfected. Platinum to-day costs from $14 to $16 per ounce, and is going still higher, regardless of the enormous demand for it, but this substitute, it is claimed, can be put upon the market for $1 per ounce. It would seem there is a great future for these two discoveries. Repeated inquiries have been made by large consumers, and in time both will probably be in general use.

AN interesting patent suit was concluded at Cincinnati last month, in which the Stoddard Manufacturing Company secured perpetual injunction against the Ohio Rake Co. The claim was upon two of the late Mr. E. Fowler Stoddard's patents on disk harrows. The claims upon which the injunction were issued, were for the hinged scraper and hinged joint.