

P. M. Grant Comments (April 28, 2016):

Below is taken from the British publication, *The Electrician*, February 17, 1883 and was originally published a few weeks earlier in the *New York Sunday Herald*.

Thanks to Steve Eckroad of EPRI for making me aware of Edison's rather iconoclastic views on storage of electricity. You can also find a copy on John Peterson's Instablog ([here](#)). I'm trying to find the original NYSH piece. In the meantime, enjoy the following.

PS: Ironically, Edison's only invention that made him "direct income," was his late career work on the Ni/Fe cell. Go [here](#).

PSS: I wonder if Elon Musk is aware of Edison's insights? ☺

THE ELECTRICIAN

FEBRUARY 17, 1883

STORAGE BATTERIES.

June 22, 2016

Error...this article was actually reprinted in the Boston Globe, not the NYSH. I'm trying to get the original.

[The *New York Sunday Herald* for January 28 gives the report of an interview with Mr. Edison. We this week give that part of the report dealing with storage batteries, and hope to give that dealing with lighting in our next issue. We have left out some of the more strongly worded sentences, and also the names, inasmuch as these do not affect the argument.-Ed. E.]

"The storage battery is, in my opinion, a catch-penny, a sensation, a mechanism for swindling by stocking companies. The storage battery is one of those peculiar things which appeal to the imagination, and no more perfect thing could be desired by stock swindlers than that very self-same thing. In 1879 I took up that question, and devised a system of placing storage batteries in houses connected to mains and charging them in the day time, to be discharged in the evening and night to run incandescent lamps. I had the thing patented in 1879 (I forget the date of the patent), but there is nothing in it. I rung all the changes on it. My plates were prepared like Plante's. The method of preparing them for charging is more tedious, but it is better than that of Faure, after preparation. You know the first storage battery was sent from France by Faure to Sir William Thomson, who was at first astounded by it. He was asked to endorse it, consented, and took a retainer; but, on investigation, he became convinced that there was nothing in it, and returned the retainer to the French company. The fact is, the more he investigated the more he found out the fallacy of the whole business. On account of what Labouchere calls a swindle this secondary battery has been used by the arc companies in England. One company alone, on the strength of an accumulator and an incandescent lamp copied from mine by _____, floated subsidiary companies whose aggregate capital was over 30,000,000 dollars, and immense sums were paid by these companies to the parent company for rights. This was the great _____ electric light bubble, in which millions were lost, and caused the now celebrated article of Labouchere. One of the leading spirits in the bubble is in this country at the present time attempting to do the same; but Carlyle's saying about 30,000,000 fools probably did not apply to foreign countries.

"Scientifically, storage is all right, but, commercially, as absolute a failure as one can imagine. You can store it and hold it, but it is gradually lost, and will all go in time. Its efficiency, after a certain number of charges have been sustained, begins to diminish, and its capacity and efficiency both diminish after a certain time in use, necessitating an increased number of

batteries to maintain a constant output. Owing to corrosion of the sustaining plates of the battery, the effect of local action, and other causes, too many to enumerate, the yearly depreciation of the battery is not less than 30 per cent, of its first cost if used daily. The facts are that there are two or three companies that have been organising subsidiary arc light companies throughout the country for some time past. In this arrangement the parent company made money by selling machinery, &c, to the working companies, but the latter are not making money, and have nearly ceased giving new orders. Now these parent companies, finding the call for machinery slacking, have come in with their secondary batteries. They now make this statement, which is the cleverest thing I ever heard of. Here, gentlemen, you have a large investment in machinery, &c, for furnishing light, but are not making any money out of it. Now, we have something by which you can utilise your machinery. You can work day and night, and can do more work. You can utilise your present plant in the daytime, and the electricity thus made in the daytime for incandescent lighting, and in the night have your plant for arc lighting direct. That sounds good and fair, does it not? The board of directors discuss the offer, and think it a good thing. Then they conclude to go into it. You know," said Mr. Edison, with something of contempt in his tone, "what the wisdom of the average board of directors amounts to. I will tell you where the fallacy in this arrangement lies. It consists in the fact that the cost of batteries to store this extra electricity that could be produced in the daytime would be twice as much as that of the station that produced it; so that, if the company has already 100,000dols. invested, and agree to utilise their machinery in the daytime by the addition of storage batteries, they will find that to carry out their desire it will cost them 200.000dols. for the batteries. I will guarantee that not one board of directors in a hundred will see it, and the parent company will not tell them of it until after they have purchased. It seems to be natural with boards of directors that if there be a wrong way to do a thing they will surely do it that way. Well, they have purchased the storage batteries, of course, at a cost of 200,000dols. On that investment, at the end of the first year, they have a depreciation of 30 per cent. To save themselves they will have to earn interest on their investment. They must, earn enough to meet the extra depreciation on their plant running through the day, and will have to spend double the amount in coal to obtain the same output from the batteries, for the reason that they interpose between the source of energy and the light, a thing in which there is a loss both in charging and discharging, and a loss in standing, and that loss increases as the battery gets older, after a certain maximum is reached."

"What is the maximum of a storage battery?"

"It is about 50 per cent. You get the maximum of current when you utilise the full capacity of the battery, the same as in a steam engine, where, if steam is admitted for the full stroke, 50 per cent, of the steam or power is wasted, but you obtain the maximum power from the engine; but this is also the minimum of economy. Hence, to get the proper economy, engine builders only take one-third to one-fourth of the maximum power from their engines, but this adds to the investment, which is compensated for by the saving in economy, which more than pays interest on increased investment. When they say that 90 per cent, is obtained from the battery they tell you what is scientifically true. They say they get 10 lights of 16 candles each per horse-power of current from a battery. Now that is true, and it is not true. If you get a horse-power of current from a battery it will give you 10 lights of 16 candles; but to get that you have to net all losses through the battery, through the wires, through the dynamo, and all that. They start off with a horse-power indicated in the engine. A certain amount of this is taken to move the engine and

dynamo, and a certain amount is lost in the dynamo to convert power into electricity, because no machine is perfect; a certain amount must be lost on the wire connecting the station with the secondary battery; another amount is lost in charging the battery, due to its resistance and imperfection as a mechanism; another amount is lost during the interim between charging and use; another portion will be lost in discharging the battery through the lamps, and still another amount will be lost in the wire connecting the battery to the lamp. So that your horsepower will dwindle down until it will give you only about three lamps; whereas, if you worked direct you would probably get six lamps."

" You are hard on the battery folks."

"The reason I am down on these people is because I have a legitimate thing, and there is a loss of public confidence in it through their operations. We have never yet asked the public for money. Now, I don't want the people swindled, for I want our company to make money out of electric lighting in a legitimate way, by giving value for what is received, and, if it sells rights, to first prove to the purchasers their value by results, obtained in actual practice upon a large commercial scale, as is now being done, and the exposure of such things would make it much easier and better for me to advance my system on its true merits. The same swindle which it is designed to perpetrate upon the people of this country has already been carried out in England, and as a result people there have lost all confidence in electric lighting. The same people are here. We have entered suits against them in England, France, and other countries, and will sue them here. But these people know well that it will take some time to get a suit decided, and by that time they will have 'permitted the public to invest heavily.'"

"Then you consider storage batteries wholly impracticable. Is there no hope for their doing good, legitimate work?"

"None whatever. Except in a very limited number of cases, storage of gas could be made analogous to storage of electricity. One of the principal outlays of a gas company is for pipes. The average diameter of their mains is five or six inches. But, under pressure greater than they now force the gas through their mains, an inch pipe would answer under the storage principle of having a small gasometer in every house. The difference saved to the company by this arrangement would be about 15dols. for pipes from house to house, 20 to 30 feet apart. But the gasometer would cost a great deal more in each house than the 25ft. of pipe buried in the street. Besides, gasometers might not be just the thing in the hands of the public; there might be explosions; some of them might not have the room. The gasometer would require some little mechanism to reduce the pressure down to a limit where it could be burnt. Now, these little mechanisms are uncertain. The general intelligence of the public, when applied to mechanism, is also uncertain; and this has probably prevented gas engineers from introducing a system of local storage. The Electric Arc Company, which is seeking to introduce a system of storage, follow out the above idea exactly. Instead of using large conductors and low pressure electricity, as I do, they propose to save on the investment by using small conductors and high pressure electricity; and, to make this kind of electricity available, they reduce its pressure by means of a storage battery in the same way as high pressure gas in a small main could be stored in a gasometer and its pressure reduced to make it available. In the first place, the high pressure current is very dangerous to life. The depreciation on storage batteries alone, in a system of general distribution,

would pay the interest on the extra copper sufficient to dispense with their use; and, second, if these small wires, carrying high pressure currents, were to be placed underground, as all systems must be to be financially permanent in large cities, the extra cost of the insulation necessary to prevent the leakage of the currents of so powerful a pressure would more than pay for the extra copper used in a system which carry low pressure currents and do not require so expensive nor so great an amount of insulation. The cost of our mains is about 15dols. from house to house. Those mains are two feet underground, where the intellectual portion of the public cannot reach it to improve it, while with storage batteries, from 75dole. to 200dols. worth of batteries would be placed in each house to save about 9dols. in copper and interpose an uncertain device in which 50 per cent, of the article to be sold is lost." Mr. Edison here paused a moment, held down his head, and, quickly raising it again, said, in his quaint way, "Just as soon as a man gets working on the secondary battery it brings out his latent capacity for lying."

"But suppose power was cheap, such as a water power, would it not pay to store electricity even at a great sacrifice of energy?"

"In utilising water power, even where the cost of water is, say nearly nothing, there is still the cost of plant for storing to be considered, and interest and depreciation added. Where is the use of this outlay when, in nearly every case, by connecting the dynamo direct with the turbine you can get the same result far more cheaply? But you will remember that water power is not so cheap after all. It is only occasionally you can run across a water power that has a surplus in every month in the year beyond the wants of those who utilise it. These storage men will tell you that lamps burn better fed from batteries than from the source of power direct. This is not so. They are very brilliant when they start, but more battery must be put on from time to time, or they will soon go down. If you have a battery that will run ten lights, and wish to run them until 10 o'clock p.m., you must have ether batteries to reinforce it, or the lamps will diminish in candle-power before the expiration of the time it is rated for. Then, alter turning off the lights, the batteries will lose about one-fifth of the charge remaining in them before being recharged. There is a natural law working against the storage battery, and that is that finely divided lead decomposes water. It is stated that when Sir William Thomson had his attention called to this fact he threw up the sponge. All metals are fuel. When oxidised they are ashes, and it takes energy to put them back again into a metallic form, when it is again fuel. Mr. Brush may say he has a secret compound. It is nothing more than a salt of lead. They use lead, and their battery is nothing more than a Faure battery, plain and simple. They say they cannot furnish these batteries for six months. There are shops in this city that could turn out 6,000 of their cells within three weeks."