A STORAGE BATTERY.

Two Young Men Think They Have Solved One of the Problems of the Age.

THEY USE STEEL PLATES.

A Party of Wise Men From New York Say the Thing Will Work.

THE ACCOUNT OF A LAYMAN.

Defects in Appliances That Have Been Put Out Up to Date.

NICOLA TESLA A DECIDED SENSATION

[WRITTEN FOR THE DISPATCH.]

Those who are engaged in developing electricity commercially and the enthusiastic young scientists who are aiding these capitalists have been greatly interested and impressed within the last ten days with an invention which seems likely to revolutionize the storage battery. This invention has been the topic in electrical circles, and while the capitalists and the scientists are not ready to accept it, it is their opinion that an experimental and actual test will be likely to reveal that it is all its inventors are disposed to claim for it.

Some years ago in that great training school for electricians, the Edison works at Schenectady, two young men, Waddell and Ernst, who were employes of the company, spent all of their spare time and frequently a good many hours when perhaps from the point of view of health it would have been wiser to have been in bed, in electrical research. As they were both bright, studious and of inventive capacity, such discipline as they gave themselves could hardly fail to have practical results.

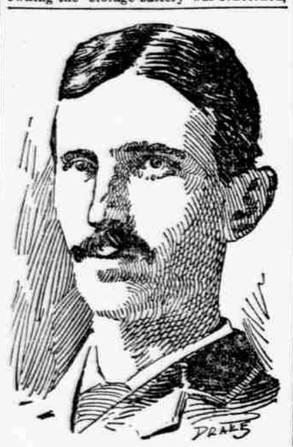
Getting a Fortune From a Motor.

They invented a motor which, when capitalists saw it and had thoroughly tested it, gained their favor, but these young men having also something of worldly wisdom, and knowing something of the experiences of other inventors, decided to control the patent themselves, for they had saved their money, and had a few thousand dollars apiece. A young friend of theirs, a Harvard student named Machetti, who had become greatly fascinated with electric science and who had some capital, joined these young men and they went to Bridgeport, Conn., and erected factories for the manufacture of their electric motor. Such electricians as J. J. Carty, E. H. Johnson, ex-Congressman Wise, who is an authority now upon electricity in its relations to the statutes, and who had no personal interest whatever in this motor, spoke in the highest terms of it.

The young scientists having that business well under way continued investigations and experiments which they had begun in Schenectady and which they thought might solve the problem of the storage battery. A few days ago a company of capitalists and electricians went to Bridgeport on invitation, thoroughly to test a storage battery which had been constructed on entirely new principles. They returned to New York, telling somewhat remarkable stories of their experiences, and while by no means positively indorsing this battery because they feel that nothing but prolonged commercial test will show that it is all that is claimed for it, yet they do say that they will be more surprised if it fails than if it succeeds.

Other Storage Batteries Too Costly.

Storage batteries have been made heretofore which did their work satisfactorily, but which involved expense and were commercially therefore of little avail. On one of the street railways in New York City street cars were fitted with storage batteries, which furnished perfectly satisfactory power, and it was thought for a while might supplant horse power used on that line. After a year, however, the cars were withdrawn, and while it was said this was due to litigation in which the company owning the storage battery was concerned,



Nicola Tesla.

capitalists were of opinion that financial reasons had even more to do with the withdrawal. In other words, it was said that it was impossible to run a street car with any storage battery then existing profitably unless more than 5 cents, which is the universal horse car fare, is charged.

The difficulty with the storage batteries, as explained to the writer by Mr. J. J. Carty, who is an influential member of the Society of American Engineers, has been first its great weight, second its liability to destruction. The storage batteries used heretofore have been supplied with lead plates, which are very heavy. When charged these plates became also very delicate. For instance, if a careless man driving a street car furnished with a storage battery turned on too great a current, speaking in untechnical language, the lead plates were liable to curl up, twist in all sorts of shapes, or, as electricians call it, "to buckle," and this practically ruined the battery and made the expense of repairing something very great.

The Young Inventors Use Steel.

The young Schenectady scientists realized that the problem was to get a battery which would be light and which would not be liable to such accidents as made the old batteries so expensive. A good many batteries have been invented which have been light, but which were still liable to serious damage by reason of carelessness.

When the electricians examined the storage battery which Waddell and Ernst had invented they were amazed to find that the inventors were making use of steel plates. These plates were very thin, and therefore light in weight, but steel for such a purpose would have been the last method which would have occurred off-hand to any electrician for such use. It was only suggested to the inventors after a long series of experiments with many other metals, and it was tried first more in desperation than with any hope that it would be successful.

Without using technical language it may be said that this storage battery consists of a set of steel plates, of a copper mat, which is made of fine copper wire very closely interwoven and then saturated with oxygenated copper, from which by treatment afterward the oxygen is removed, making what is practically a solid copper plate, but as thus constructed better for this purpose than a sheet of copper would be. In caustic soda, also in the battery in liquid form, zinc is held in solution, and when it is desired to charge the battery, by a mechanical contrivance a current of chemical electricity is established. The effect of this is to take the zinc immediately out of solution and it is attracted at once to the steel plates which it heavily encrusts. The amount of storage is determined by the amount of zinc thus used. Thus the battery is charged and is placed aboard a street car or wherever else it is desired to use it. When it is desired to start the car, mechanically a reactionary current, so to speak, is established through the chemical properties of the copper mat which causes the zinc to leave the steel plates, go again into solution, and this creates an electric current which furnishes the power for running the street car.

Both Light and Substantial.

Many experiments, some of them severe ones, seem to indicate that nothing but a collision or a pick-ax could destroy this battery. The full force of the current was applied instantly, and there was no effect whatever upon the battery, although a powerful electric force was thus generated. Were the full force to be applied to the old storage batteries instantly, it would have caused buckling, and thereby destroyed them. This battery, moreover, is very light, and aside from its safety meaning by that its slight liability to accident, it was claimed for it that it was cheaper to make and cheaper to operate than any battery yet used.

This battery has been used on one street car line in Chester, Pa., experimentally, and if the reports of the managers of that line are to be believed, with entire satisfaction. It was taken from the car a few weeks ago for purely business reasons, but it is quite likely to be fitted again to all the cars running on that street railway. If the predictions are correct and the impressions of electricians who have no pecuniary interest in this motor are justified, it is quite likely within a year that it will revolutionize the use of electric power as applied to street railways and some other purposes. Mr. Carty does not hesitate to say that if this battery is what it seems to be within five years the majority of street cars in the United States will be equipped with it. At all events its development is one of the things which the intellectual giants who are engaged in the commercial and scientific development of electricity are now most earnestly discussing.

A First-Class Scientific Sensation.

Another development of electricity which is occasioning vast discussion are the experiments of Nicola Tesla, who is well known in Pittsburg. Some months ago Tesla conducted a series of experiments before the American Institute of American Engineers at Columbia College in New York City. His experiments were so fascinating and astonishing that the society remained nearly all night. Tesla is a Montenegroan, still a young man, who has lived a number of years in this country and has become an enthusiastic student of electricity. Taking as a basis some experiments made in Berlin, Tesla still further developed them until he was able to show these electrical engineers some remarkable experiments. His discoveries did not, outside the electric world, attract much public attention until last fall, when he went to England and repeated them before some of the leading scientists of that country. These men were so amazed that Tesla became really a scientific sensation and an elaborate account of his experiments was prepared for one of the reviews which attracted wide attention, both in Europe and America.

Word has just been received by the American Society of Electrical Engineers that scientists all over Europe have been urging Tesla to repeat his experiments, and he is now on the continent actually amazing the scientific electricians with an exhibition of his discovery, for it is that. Tesla has, by means of an electric current whose waves are extraordinarily rapid and which are believed to be nearly identical with light waves, been able to carry this current without any artificial conductor from one point to another. For instance, he will stand between two plates, one on each side of a room, which are connected by a wire, not with one another, but with the battery which supplies these peculiar electric waves. No connection exists between the plates. When the current is turned on he, holding an incandescent lamp, reveals that there is a passage of the current between the plates through the medium of the atmosphere or ether in the room, because the lamp immediately becomes lighted, just as brilliantly as though it was connected by wire with a battery.

The Theatrical Effects Obtained.

Tesla has diversified these experiments by having a wand which is illuminated as he thrusts it within the reach of this current, and in other most beautiful and almost spectacular ways he makes evident that an electric current who se waves are of peculiar form and velocity may be conveyed through natural media. Another remarkable development is that this current is made to pass through wood or stone or brick, exactly as light passes through a windowpane, and without the slightest effect upon these obstructions.

These discoveries have not yet been put to commercial use, but the men of intellect who are giving their time and capital to electrical developments are of the opinion that Tesla's discoveries are likely to be within the next few years so commercially developed that they will practically revolutionize some forms of electrical application. Some of the electricians are inclined to think that the first commercial utilization of this discovery will be for vessels at sea. Edison has in mind a plan for electrical communication, not fully developed yet, but which would require the use of water as the medium of conduct. If Tesla's plan can be developed, and there is no doubt that he himself is at work upon the problem, it may be possible for two vessels fitted with the proper mechanical appliances to communicate by a code of signals with each other, although they may not be in sight. If the idea is carried out successfully, this would prove of extraordinary value whenever there was heavy fog at sea, for one of Tesla's experiments has shown that this current will pass as easily through fog or mist as it would over a wire. The experiments are causing great scientific activity upon the Continent of Europe, and the opinion of New York electricians is that we may hear of the commercial application of Tesla's discoveries first from that side of the water.

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OR, FOUR YEARS ON A NEW BEDFORD WHALER.

WRITTEN FOR THE DISPATCH

BY CAPTAIN J. H. B. ROBINSON.

The Straightforward Tale of a Plain Sailor's Actual Adventures on a Cruise in the Stormiest Seas of the World.

CHAPTER IV.

A NARROW ESCAPE.

On January 10 we were sent to masthead earlier than usual, as the mate stoutly insisted that he could "smell" whales. It is true that there is a very perceptible odor from a whale, and with the wind favorable his presence is often noticed at night when it is too dark for him to be seen. On the present occasion there was a reward offered for the man who should first announce the presence of a whale, provided we afterward succeeded in securing him. So we ran up the rigging willingly, although as yet we could hardly see a mile in any direction. Hardly had I reached the topsailyard, when the man at the mizzen shouted:

"There she white waters!" And in another instant the boat steerer at the main had caught sight of something off the lee beam, and, hailing the deck, he shouted excitedly:

"Large school of sperm whales on lee beam, sir, big ones, only about two miles away!"

By this time every man was on deck, and the boats were rapidly lowered.

Whenever we had lowered for practice the mate had invariably succeeded in capsizing or staving his boat, and on the present occasion the big Dutchman, Hans, who was one of the mate's boat's crew, and whose duty it was to see that the oars and bailers were all in the boat, made his appearance with a huge bucket, which he was placing in the boat, when the mate snarled out:

"You big doubled-headed Dutchman, what are you putting that in the boat for?"

"Vell, Mr. Laurie, I dop' vas know how to swim, and I dinks ve bedder dake it along to bail de boad vid ven we gets dipped ofer!"

The look of perfect honesty with which he said this satisfied even the mate that no reflection on his skill as a boatman was intended, but the second mate and I had hard work to smother our amusement.

Once clear of the ship up went the sails, as the whales were to the leeward of us, and away we went with a good breeze. We soon ran down among them, and Mr. Perry, our fourth officer, who was harpooner in the Captain's boat, stood up with his knee in the "clumsy cleat," and every nerve braced for throwing the keen iron. We shot across the corner of the whale's flukes, and I looked over the side of the boat, where I could see the huge black fan moving from side to side, not more than two feet under us. I knew if he lifted it we should be sent flying into the air like things of no weight whatever. However, we passed safely over and shot alongside the whale's hump. I saw Mr. Perry draw back his arm and like a flash the iron flew through the air and buried itself near the whale's shoulder blade. The second iron was poised for a throw, but the whale settled like lead upon feeling himself wounded, and up went the dreaded flukes, just clearing our boat, and filling it half full of water.

"Stern all! I'm fast! cried the boat steerer. "Stern! Stern!"

"Stern for your lives!" cried the old man, and then with a yell:

"Good God! Look out!"

Before we had time to realize what new danger threatened us, a loose whale shot its enormous head out of the water not ten feet away, apparently coming directly for us. While we sat almost stunned and waiting to be crushed, the line was flying out of our tubs as the whale we had struck "sounded" at a great speed.

Our new neighbor came slowly toward us, and when his head almost touched ours he sank under the surface and went directly under the boat, his "hump" raising us gently a few inches, but doing no damage. I cannot answer for the feelings of the other men, but I am sure I should not have crushed an egg had it been between me and the seat I occupied.

I was aroused by the voice of the old man:

"By thunder, Mr. Perry, that was a purty clus shave! Now get the mast and sail in lively, and we won't haul up alongside our fish yet. There's three or four loose fellers round, and mebbe when he comes up they'll run with him and give the other boats a chance to get fast. There he is now, to wind'ard! And thar goes the second mate and mate, too, after 'em other fish. Somebody gimme a chaw o' tobacker!"

I passed over my plug and saw half of it disappear into his mouth, while the remainder went into his pocket. (To do him justice I will say that some days afterward he gave me a pound of the weed to remunerate me).

The boat steerer now went aft and took the steering oar. The mast and sail were carried aft and one end of the former placed under the afterthwart, while the better part of both projected far over the stern and out of our way. We then "peaked" our oars and faced the bow of the boat. The old man occupied the bow, and we pulled in the line "hand over hand," while the boat steerer allowed it to pass over the stern into the water. For a short distance the whale towed us at a speed certainly not less than 15 miles an hour, but the iron interfered sadly with his locomotion, and he soon allowed us to come up with him, and then the old man sent the sharp lance again and again into his vitals until the water from his spout holes began to be tinged with red, and a shout went up from the boat's crew, as we saw the infallible sign that the whale was mortally wounded.

We backed off out of the way while the death agony or "flurry" lasted. At last the monster slowly rolled over, "fin up," and we knew he was dead.

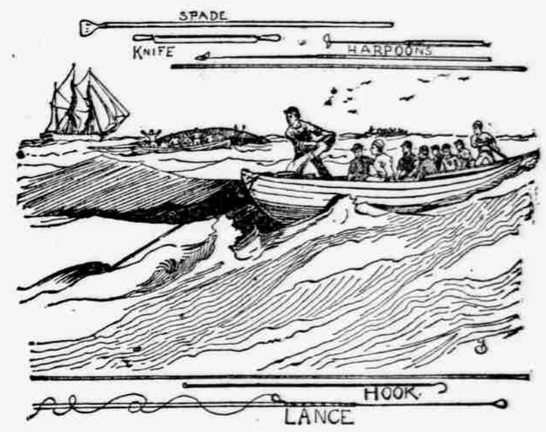
In his agony he had wound our line more than a score of times around his body, and while we were clearing it the other whales, pursued by the two boats, came close by us and we saw an exciting chase. The old man was wild with eagerness, and danced and yelled as if he could in that way assist in the speed of the two boats, which were close to the whales, the men pulling like giants, while the officers in the stern, each eager to be the first to "get fast" under the captain's eye, used every known method to urge their men on. We could hear them like rival bidders at an auction.

"Pull boys, pull! You ain't half pulling! Put in another pound of backbone! Jump her. I say! Do you want the mate to beat us? A new shirt for every man in the boat if we get fast before 'em! That's the way to do it! We're gaining on 'em!"

While from the other boat a stream of entreaty and profanity, coupled with offers of everything a sailor values, testified to the enthusiasm of her officer.

As luck would have it, poor Hans "caught a crab" with his oar and the second mate's boat shot ahead and "Long Joe" Lumbert drove two irons into a large bull whale. Away they went to windward at a terrific speed, while the old man cheered and laughed and the tobacco juice rolled down his neck and stained his hairy bosom without his noticing it.

The mate was cursing everything "an inch high and a minute old" when up came a large whale a short distance away, and off went the boat in pursuit. This time no accident occurred and they soon started off in tow



THE MONSTER TOOK THEM IN TOW.

of the whale, cutting through the seas at race-horse speed. We now placed a "waif" or flag in our whale and returned to the ship, put the Captain on board, and taking some coffee in a bucket, and some salt beef also, went back to stay by our whale while the old man worked the ship to windward after the other boats.

All day we lay alongside the dead whale, while the old Triton beat to windward, and finally we lost sight of her entirely. Then night came on and a strong breeze sprang up, but we fastened our boat close to the leeward of our prize, cut a gash in his blubber, and the "slick" formed by the oil prevented the boat from shipping any water. The sharks were now attracted, and the water was fairly alive with them. We killed dozens of huge man-eaters with our boat spade, one blow on the nose being sufficient to render them "hors du combat," but still they increased in number until we were very uneasy. To sit in a frail boat and look over the side directly into the cold, green eye of a ten-foot shark without flinching is a feat few can perform. There is something blood curdling in the expression of a shark's eye that I am at a loss to describe.

The sea birds were also on hand in thousands, and their discordant screams as they fought for tidbits with the sharks and with each other rendered sleep impossible, even had not the danger of our position precluded any such idea on our part.

It was a night long to be remembered—the sharks tearing at the whale's blubber, splashing and fighting, the wind sending occasional showers of spray over us as a larger sea than usual struck the body of the whale and broke high above it. Wet, cold, and hungry, as I was, I missed my tobacco more than anything else, and I mentally registered a vow never to offer the old man my plug again, if indeed I was spared and had the chance. But at last daylight came, and, to our astonishment and delight, revealed the old Triton about a mile to windward, while we could plainly see the other boats hoisted on their cranes, and the huge cutting gear was being hoisted in place. The old bark was soon seen near enough for us to see that she had a large whale alongside. We towed our "double spouter" to the vessel and found the second mate had been obliged to cut from his whale on account of darkness, but the mate had been more fortunate and had killed his without accident.

CHAPTER V.

DOUBLING THE CAPE.

For several days after the events recorded in the last chapter we were hard at work night and day cutting in our whales, and "trying out" the oil, which at last was safely under the hatches.

A most amusing incident occurred during the process. One dark night, when the fire was streaming from our two smokestacks as the scraps were shovelled into the fireplaces, a large ship ran down within hailing distance, and the Captain shouted through his trumpet:

"Bark ahoy!"

Captain Keys immediately answered:

"Ahoy there!"

"Want any help?"

"No, thank ye," from our skipper, "we're all right."

"What's all the blaze?"

"We're 'trying.'"

"Trying? Looks as though you were trying to set your ship afire!"

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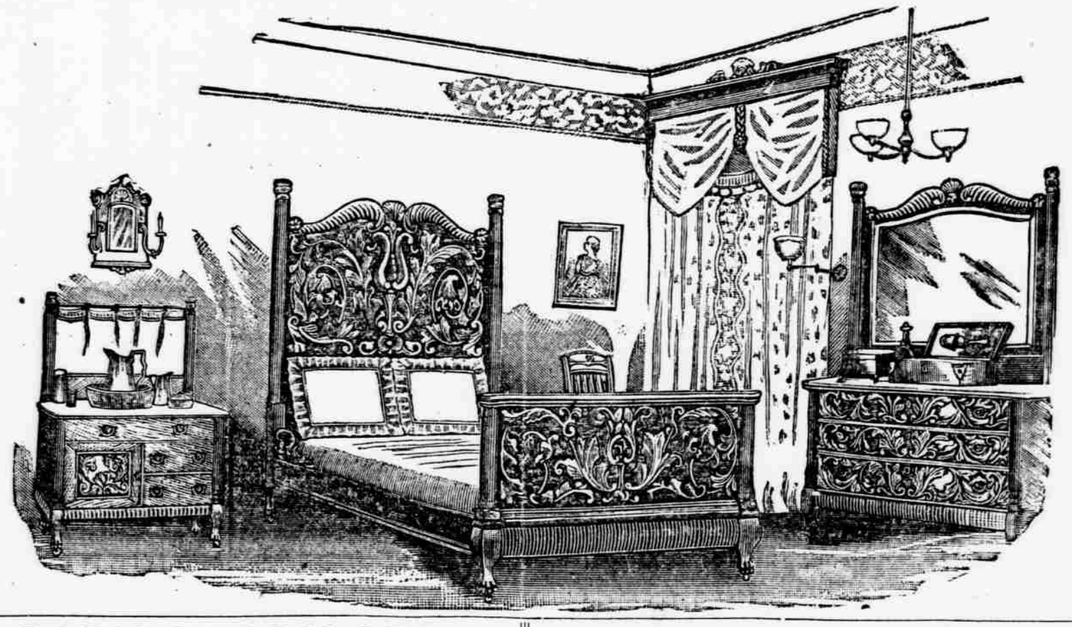

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