EDISON'S LATEST TRIUMPH

Storage Battery Which Will Revolutionize Portable Power Operations.

OF NICKEL STEEL AND INDESTRUCTIBLE

New Battery Is a Marvel of Endurance, Effectiveness and Capacity—The Story of Its Production.

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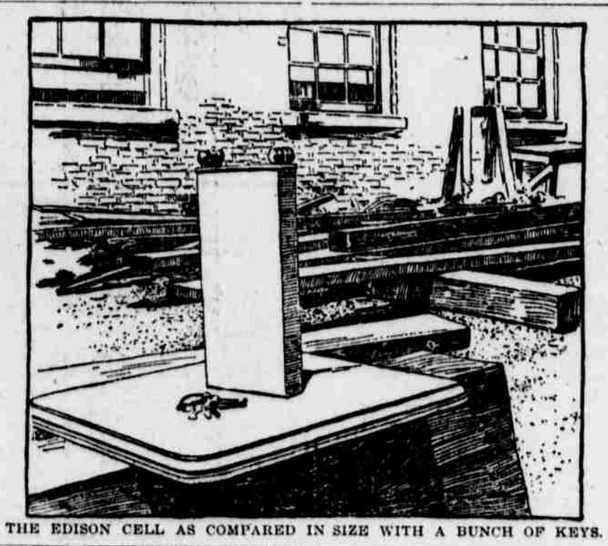
The announcement that Thomas A. Edison has invented a storage battery of great economic possibilities has been widely heralded as another achievement of this wonderful constructive genius, but because we are so used to his perennial power for wonder working the true significance of the event is apt to be underestimated, yet this latest achievement of Edison is probably destined to work as great changes in its way as did the electric light. It is the successful realization of an idea on which millions of dollars have been spent and for which scores of inventors have labored the best part of their lives. Since 1860, when Plante discovered the lead cell, there has never been a moment when some experimentalist has not been working to achieve what Edison has just achieved—the successful bottling up of power which might be transported safely and used again at any time and place, just like any other form of merchandise. Hundreds of forms of storage batteries have been invented, but the limitations have generally far outweighed the good points of each, and it has become an axiom in the trade that storage batteries are far more delicate and much more unreliable in critical moments than race horses.

Its Marvelous Adapability.

The fact must be easily apparent to everybody that the ability to carry around in the palm of one's hand the power that can, so to speak, move mountains, would be almost an omnipotent possession. And this, in a lesser degree, is what the successful storage battery means to mankind. Storage batteries composed heretofore of destructible lead have in the first place been too heavy for anything but stationary work, and in the next place too delicate to be handled by anybody but a highly skilled engineer. The Edison battery, made of remarkably thin, but indestructible steel, is so light that you may hold in your hand a cell which is equal in power to one of the lead variety that could hardly be lifted by two men and which defies even a deliberate attempt to do it harm, a fact proven by Mr. Edison, who commissioned one of his men to try every means of wrecking the cell short of actually tearing it apart.

Edison's Working Ideas.

It is an axiom with Edison that if an invention shows one or more defects the underlying principle must be wrong, his idea being that if the correct principle is determined upon in the first place all of the details of the mechanism will become evolved naturally and take their allotted places in the completed machine. He will never consent to "patch up" a faulty invention. In his mining plant on Mount Musconetcong the writer has admired the complicated working of mechanism that filled a large building from cellar to roof and then has been amazed at the inventor's determination to raze the whole affair, building and all, to the ground because the impossibility of eliminating some defect convinced him that the principle was wrong in the first place. But Edison's indefatigability apparently carries him to the very ends of things. For instance, he made exactly 1,800 experiments before he hit upon tungstate of calsium to be used in connection with the fluorscope for making the penetrating power of X-rays visible to the human eye. He made several thousand experiments before he succeeded in manufacturing a proper adhesive substance for binding together the particles of finely divided iron ore so that the ore could be smelted. I once saw him laboring with an ore furnace trying to repair the draft so that there would be exactly the same heat in all parts of the furnace. It was



THE EDISON CELL AS COMPARED IN SIZE WITH A BUNCH OF KEYS.

midday and he was eating his luncheon on a work bench. He had not slept for twenty-four hours. I asked him how long he expected to keep it up. He answered: "All night tonight and tomorrow and tomorrow night and the day after tomorrow if I can stand it." He perfected the flue system, however, before the next night.

In view of his axiom, therefore, it could have been asserted by any one who knew him that his new battery would differ radically in principle from all that had been used before, that it would differ even from the hundreds he had himself invented and discarded. He set himself the task of inventing a battery that would not deteriorate by work, that would stand rapid charging and discharging and careless treatment, that would have a very large storage capacity and would be inexpensive.

"Just what that means," said one of his men to the writer in the laboratory recently, "may not strike the popular mind. In the first place Mr. Edison set out to discover what was the matter with the old lead cell and after a number of experiments he made up his mind that 'the principle was all wrong.' He tried to combine other materials with the lead. He tried dozens of solutions known to chemistry and other dozens known only to himself. He dropped lead and turned to other metals, trying one combination after another. He changed the form and the capacity and the density of each and he discarded them one after another. Sometimes certain metals would seem to work and we often thought him on the high road to success. Then there would arise some defect. The cell would not stand up to enforced work, or it would not stand rapid charging, or perhaps it was perfect except in that it would not stand careless treatment—and then away it would go after its fellows into the scrap pile. Finally Mr. Edison made up his mind that iron and nickel variously combined with other substances must be the metals he wanted. And after that he began to see the end of the struggle."

Invents a Wonderful Roller.

But here arose a contingency which the man in the laboratory did not mention—a contingency which would have balked most men. In order to use iron and nickel the metal first must be so treated that very peculiar shapes and a remarkable degree of thinness could be obtained. There were no machines in existence that could give it the peculiar shapes and not one of the rolling factories then working could turn it out thin enough to suit the inventor's needs. Mr. Edison, therefore, immediately turned his attention to the invention of machinery that would give him what he wanted. He made a remarkable hydraulic press that in itself is a wonder and a rolling machine that will render nickel steel so thin that anyone seeing and holding it for the first time might declare it a piece of thin aluminum or perhaps a form of stiffened tinfoil. Doubtless the public will never see these machines, for with many others which Edison has invented for similar preparatory offices they will be held from view as trade secrets. After all, however, the public cares in this case only for the completed cell and what it will do.

What the Thing is Like.

Of course, cells may be made of any thickness according to the number of plates put in each, but those to be used for automobiles, which is the kind made so far by Edison, appear externally to be about the size of those flat tin boxes into which brokers thrust stock certificates and which can be slipped into the outside coat pocket. Nevertheless, this flat box is made of thin sheet steel. The plates that are contained in the box are the essential elements of the battery. They also are steel and when first made resemble small window frames in which oblong slits have been cut to receive the panes. Into each of the slits, in lieu of window glass, go little flat perforated steel boxes which contain the active material in which the electricity is stored. The boxes in the positive plate contain a finely divided compound of iron mixed with thin flakes of graphite. The boxes in the negative plate contain a finely divided compound of nickel mixed also with graphite. A little flat perforated box of the material is placed in each window of the plate and then the whole plate, boxes and all, is placed in a hydraulic press and subjected to a pressure of 100 tons, which so thoroughly amalgamates the combination into one solid plate that only the most remarkable ingenuity could separate the various parts. The plates, positives and negatives alternated and separated by perforated rubber plates, are then placed in the steel box cell which contains a solution of potash. The cell is then ready to be stored full of current. In other words, if the current from a dynamo is sent into it for a number of hours a like quantity of electricity may be drawn off from it again at any time.

His Tests Are Thorough.

Now the inventor reached this stage of his work nearly a year ago. In other words, he perfected the battery during the latter part of 1900. But cautious lest some unnoticed weakness might develop after all, he made a number of personal tests, at the end of which he seemed worried. "Why," he said, "I can not break it down. It is too good to be true." Then he followed Darwin in the manner of treating his discovery. When Darwin evolved his system of evolution his natural scientific caution prevented him publishing it. He was afraid his brother scientists might see in it some flaw which had escaped his own observation. He thereupon set to work to find arguments against it. He waited a number of years before he dared announce it to the world and he did so then only after he had successfully answered every objection that could be raised. Edison in the same way has always followed this rule, although, of course, the time limit for inventions is naturally shorter. When he perfected the phonograph he made a test of its endurance. He handed a cylinder to one of his men with the laconic direction: "Work this until it wears out!" The man set to work counting the number of times he used the cylinder. Several days later, when it had "talked" for the ten thousandth time, he told Edison that, far from wearing out, its "voice" sounded clearer than ever. Edison told him he might discontinue the test. And in the same way the inventor handed his storage battery to a workman with directions to use every legitimate means to wear it out. So, reckoning from his knowledge of lead batteries, the workman overcharged it. It remained intact. He discharged it many times faster than the normal rate. Still no harm. He allowed the solution to become low. He subjected it to quick and violent changes of temperature. He moved it about more as he might have

an old coal scuttle than a storage battery. In short, he used against it every mechanical argument he could think of. He placed it in a shocking condition as batteries go and left the result to time. A lead battery would have gone to the scrap heap long ere that. Yet after months had passed the battery, like the phonograph cylinder, was in as good "voice" as ever. Then Mr. Edison, without flourish of trumpet, announced the result to the world.

Its Meaning to the World.

And what a result this really is can scarcely be realized. The old lead battery, such as is now used in automobiles and street cars, varies in weight from 124 to 186 pounds per horse power, and, generally speaking, would be capable of raising its own weight two to three miles. The Edison battery weighs fifty-three pounds per horse power and would be capable under circumstances similar to those imposed on the lead battery of raising its own weight through a vertical distance of seven miles. Approximately an Edison battery of equal power with a lead battery will weigh one-third as much. Also the solution is of such a character that the top of the cell may be closed and the cell itself used as a dry battery, so that in the case of a horseless vehicle it may be jolted about as much as necessary without fear of a collapse.

The advantage of the new battery over the old will be easily seen in every instance of portable electric power new and use and the possibilities of new and greater uses are manifold. In traction there is the feasibility of getting rid of objectionable trolley wires. Its bearing on the development of the automobile is too obvious to need extended comment. The value of the storage battery for launch propulsion was well proven at the Columbian exposition with lead batteries three times as heavy as the Edison cell. Perhaps the difference in weight will warrant the adoption of the cell on fairly large yachts. But the feature which more nearly concerns the home comfort of the greater mass of the people is the adaptability of the cell for country house lighting. The cell may be charged in three and one-half hours, hence the farmer or the country householder generally may employ the resources of an adjacent trolley line for charging his cells a short time each day, or with a windmill coupled to a small electric generator he could bottle up enough current to give him light at night. It would be quite possible to establish central stations in various towns throughout the country which could be used as cell-charging stations, from which workmen might set out each day in wagons collecting cells to be charged and delivering full cells in their stead to be used by the householder for purpose of illumination. Such a scheme could be operated at a cost much lower than the present price of gas.

Development of Ideas.

But better than all is the contemplation of that remarkable incentive which begot this cell and the other wonders that seem to emanate perennially from the inventor's brain. Four years ago the writer, describing Edison's iron mining plant, wrote:

"The present enterprise was planned years ago and now that it is finally completed Mr. Edison's mind will revert to even greater schemes of conquest; and at this moment it is safe to say that he is planning out some great achievement which will take the world more by storm than have the great things he has already accomplished."

And by that was meant this storage battery which he has just given to the world. Edison more than any other mechanical genius has realized the truth of the Kipling aphorism that the "joy of the working" is more to be desired than the fame which results. THEODORE WATERS.

Lawyers Taking In the Sights.

DENVER, Aug. 24.—About 400 persons, members of the American Bar association, relatives and friends, left Denver this morning in a special train to visit points of interest in the mountains. In accordance with custom, next year's meeting will be held at Saratoga Springs, N. Y., August 27, 28 and 29.