### HAILSTONES OF GREAT SIZE.

We publish herewith an engraving taken from a photograph which was kindly furnished us by Mr. Frank Minter, of Corning, Kansas, which shows a wonderful fall of hailstones which occurred on the afternoon of May 3, at that place. Mr. Minter says the pan of hailstones was scooped up promiscuously half an hour after the storm, and in order to show the great size of the specimens, he has placed alongside of the pan an ordinary sized hen's egg, while in the pan are some potatoes. Mr. Minter says, "We have often heard of hailstones as large as hen's eggs, but these are considerably larger. When the photograph was taken they were a good deal smaller than when they fell. Some were found that measured thirteen inches at their greatest circumference. The roar of the approaching storm could be heard for fully a quarter of an hour before its arrival. Scarcely any damage was done, except to chickens and wild birds, and no less than sixty dead birds were counted along one mile of hedge."

### Telegraphing Around the Globe.

CHAUNCEY M. DEPEW'S ADDRESS AT THE NATIONAL ELECTRICAL EXPOSITION.

On Saturday evening, the 16th inst., at the Grand Central Palace, of this city, a successful attempt was made to utilize the electricity generated at Niagara Falls for sending a message around the world and back, arrangements having been made in advance with the several companies, and it was a very remarkable feat illustrating the excellent telegraphic facilities now provided.

It was arranged that Mr. Chauncey M. Depew should send one dispatch, which after passing over the globe and back should be received by Thomas A. Edison in another part of the hall, and at the same time Mr. Edward D. Adams, of the Niagara Power Company, should send a reply to Mr. Depew over the whole globe and back from the box occupied by Mr. Edison in opposite end of the hall.

At 8:34 o'clock Mr. Depew handed the following message to A. B. Chandler, the president of the Postal Telegraph Company: "God creates, nature treasures, science utilizes electric power for the grandeur of nations and the peace of the world." The exact moment of the sending of the message on its journey around the earth was announced by the firing of cannon on the roof of the building. In its transit it first traveled via Chicago, Los Angeles, and San Francisco to Vancouver. From the latter place it was sent through Canada by way of Winnipeg, Montreal and Canso and then cabled to London, from where it was continued to Lisbon, Gibraltar, through Malta, Alexandria, Suez and Bombay, to Madras, and thence via Singapore, Shanghai and Nagasaki to Tokio, from which center it was sent back by the same lines to London and to America. The message was received back in Mr. Adams' box, at the Grand Central Palace, by Thomas A. Edison at 9:21½, having occupied an elapsed time of just forty-seven and one-half minutes.

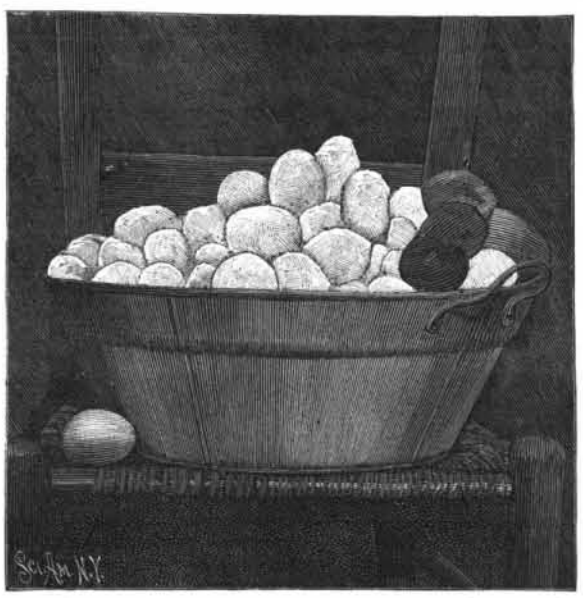
Four minutes after the dispatch of the message, Mr. Adams forwarded an answer to Mr. Depew along the Western Union wires over the same route, which read: "Mighty Niagara, nature's wonder, serving man, through the world's electric circuit proclaims to all peoples science triumphant and the benevolent Creator." The time of transit of this message was exactly the same as in the previous case, the distance over which each one was sent being 27,500 miles. The same telegrams were also sent to Galveston, Tex., to Mexico, right around the South American continent, then to Lisbon and London and back again to New York, and the distance which it covered of about 10,000 miles was traversed in twenty-one minutes. The receipt of the messages at the various centers was signaled to the people in the exhibition by the firing of the cannon, and each report was met with a hearty outburst of cheering.

While the messages were being transmitted, Mr. Depew entertained the audience with a brief review of the world's progress, especially as it concerned the development of the use of electricity. Among other things he said:

"The rise, the rule for thousands of years and the fall of Rome are condensed in a few volumes upon the shelves of the libraries. These events covered unnumbered centuries, and yet in the humanization, the elevation, the civilization and the happiness of the people of the earth they did little compared with the accomplishments of inventive genius during these four marvelous decades. The electric telegraph in 1845, the cable in 1856, and the telephone in 1876 are part of the victories. We can only measure the results of these inventions by estimating their influence upon commerce, transportation and the material development of nations and the effect upon governments and peoples of instantaneous communication with each other. Thirty years ago there were 75,000 miles of wire in the United States; to-day there are 1,000,000 miles. Thirty years ago 5,000,000 messages were annually transmitted by telegraph; now there are 60,000,000. In a quarter of a century the receipts of the telegraph companies have increased from $7,000,000 to $25,000,000 per year. Since the opening of the telegraph the imports and exports of the United States have grown from $220,000,000 to $1,600,000,000, while the internal commerce of the country has grown from about $1,000,000,000 to the fabulous figure of $25,000,000,000 a year.

Said the great English scientist, Sir William Thomson, at our Centennial Exposition in 1876, after he had examined the telephone: "What yesterday I should have declared impossible, I have to-day seen realized." In twenty years the use of the telephone has become such a necessity in our daily life that the mileage of the telephonic wires had increased to 600,000 miles and the number of telephones to 700,000. Nothing more distinctly illustrates the truth of the charge that the Americans are a talking people than the statistics of this wonderful instrument, for during the last year there were had over the telephone wires of the United States alone 670,000,000 conversations. And yet the telephone is only partially developed.

Time will permit only a brief suggestion of the rapid introduction of electricity into every department of industry. It furnishes power for the mill and the machine shop; it is the motor for the railway carriage; it heats and it cools; it forges and it welds, and it extracts from the most stubborn ores ordinary minerals and precious metals. In our practical age the dividing line between the scientific toy and profitable power is the cost of production. The price of coal limits the possibilities of settlement and the growth of cities. Industries and their development are dependent upon steam and electricity, and the generation of these forces upon coal. The most superb agricultural opportunities of the world are upon the Pacific coast, but the varied industries necessary for the support of a large population do not thrive there, because the black diamond has not



WONDERFUL FALL OF HAILSTONES.

been discovered in the Sierra Nevada or the Sierra Madre.

This exposition illustrates another beneficent advance in electrical development. It suggests an opportunity to escape from territorial limitations of coal and the prohibitive cost of transportation. Wherever there are mountains and lakes there is water power. That this power can generate electricity has been known, but its usefulness has been handicapped because the mill and factory could not be readily transplanted. The most sublime concentration of continuing force in the world is Niagara Falls. After the unveiling of the Statue of Liberty Enlightening the World, which had been presented to us by the French republic, I took the representatives of the French government to Niagara Falls. When they saw it their feelings were aptly expressed by Admiral Jouett, who exclaimed with dramatic earnestness, "I have seen all the natural wonders of the globe and this surpasses them all. If there shall ever be an exhibition of the universe when the stars and planets contribute their best, the earth will send Niagara Falls.

We are here, 450 miles from Niagara, and witnessing that the power generated there can be transmitted here. It is a demonstration of incalculable value. It will redeem the waste places of the world. The tumbling torrent will become the treasure house of nations. Wherever water flows electrical power may be generated, which, transmitted great distances, will create the mill, the factory and the furnace, and give that employment to capital and labor which relieves the farmhouse of its surplus of boys and girls and gives the farm its profitable market in a neighboring seat of population and industry.

The next feat of electricity, now almost accomplished, is to be its use in transportation. It is to accelerate the speed and increase the comfort of the passenger train and to reduce the cost for the revolving wheels of the freight car; it is to be largely the substitute for the horse, for agriculture and the road wagon; it is to furnish the light for dwelling and factory, for hospital and highway; it is to give the heat for cooking and for comfort; it is to be the power for the machinery of the mill and the press of the newspaper; it is to be the motor for transportation by land and sea."

### Steel Roads.

The latest suggestion for an improved form of roadway comes from Mr. Budd, the commissioner of public roads of New Jersey. In his report to the governor Mr. Budd recommends that steel be used in the construction of roads both in town and in country. Some of the best authorities have predicted that the coming material for highways will be steel, but just exactly how it is to be used they did not say. In Mr. Budd's plan broad steel rails are to be placed for the accommodation of traffic where the travel is greatest, while the remainder of the road can be made of granite or wood.

The average cost of a macadamized road 16 feet wide is about $7,000 a mile. The cost of a double track steel road 16 feet wide, filled in with broken stone, macadam size, the commissioner puts at $6,000 a mile. A one track road would only cost $2,000 a mile. The rails, which are really flat plates of metal, are made of steel the thickness of an ordinary boiler plate, gutter shaped, five inches or more wide, with a square perpendicular shoulder half an inch high, and then an angle of one inch outward, slightly raised, thus forming a conduit for the water and rendering it easy for the wheels to leave or enter the track.

The advantages claimed for the metal road are: First, great durability; second, a horse can draw on a steel track twenty times as much as on a dirt road and five times as much as on the best macadam.

The tracks would really be very much like a horse car track, were it not for their much greater breadth and the slight, sloping rib instead of the high rib of the street car track. There would be no wrenching of wheels and bending of axles, such as a car track often causes, and the wheels would roll on and off the steel track or plate with the greatest ease. Another feature in the steel rail idea is the absence of jolting, which ruins the wagon.

The principal point, however, which would be gained is the great durability of the steel road. Even the hardest granite is rapidly worn down. Holes and ruts form, and once formed, rapidly become larger, until costly repairs are necessary to make travel even possible. The steel tracks would be cheap, easily renewed and almost everlasting, while the material between them need only be some cheap roadmaking soil. The rails would take up all the wear and the soil between would furnish good drainage. Other tracks nearer the curb might be added for the accommodation of bicyclists, who would not then be jolted nearly to death, as they are in going over uneven granite blocks.

The steel track idea is not entirely new. On many bridges broad steel plates have been laid along that part of the road where travel is greatest. The curbs of the bridges in London are lined with steel to prevent the grinding away of the stone by cart wheels. Steel roadways would work wonders in regulating street traffic.

For city purposes the steel road would have to be laid with great solidity. The latest pavements of Belgium blocks in New York are more solidly constructed than any other kind of road, but it is hard work to keep them level. On Broadway blocks of the best Maine granite resting on solid concrete a foot thick are firmly bound together by sharp road sand and asphalt. In the steel road the tracks would be laid on cross ties of steel, with all interstices filled in by concrete and water proof cement.—The Northeastern Lumberman.

### Brooklyn Bridge Electrical Equipment.

The trustees of the Brooklyn Bridge have made provision for the expenditure of $100,000 for new electrical equipment. Two Babcock & Wilcox boilers, of 400 horse power each, two 600 horse power engines by the Southwark Foundry and Machine Company, and two Walker generators will constitute the power and light plant. Twenty cars, 48 feet long, equipped with electric motors, will be furnished by the Pullman Car Company. The trustees estimate that, by installing their own plant, they will save $55,000 yearly to the two cities. The improved terminal switching facilities, coupled with the new electric equipment, will enable the headway to be reduced to one minute.

### Method of Silvering Mirrors.

A curious method of silvering mirrors has recently been patented by M. Hans Boas, of Kiel (says Engineering). It is based upon the fact that, when one of the heavy metals forms the cathode of a vacuum tube, containing a trace of hydrogen, the metal is volatilized by the current, and is deposited as a firmly adherent and highly polished layer on the walls of the tube. The mirror thus produced is said to be of much greater brilliancy than can be obtained by ordinary methods.

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