Correspondence.

To the Editor of the Scientific American:

Inclosed find clipping from the *Times* in regard to the storm here. Please explain in SCIENTIFIC AMERICAN. H. C. MORRILL.

White Lake, South Dakota, Feb. 12, 1891.

"On Saturday night last, at about eleven o'clock, the wind raised and snow commenced to fall, the two making what is commonly called a blizzard, and continued until about four o'clock Monday morning. It was not so cold, but otherwise was as severe a storm as that of January 12, 1888. We have heard of no casualties or suffering, as people were generally at home and stock housed. One peculiarity of the storm was the large amount of electricity notable everywhere, persons coming in contact with each other or with any metal substance, or two pieces of metal, or in fact any two objects that were not non-conductors, would throw off visible flashes with a sharp snapping sound. When this happened to persons a very perceptible shock was felt, even through thick clothing. It was a very peculiar although accountable occurrence."

[The phenomenon described in the slip is a winterelectric storm. These storms are not frequent, but well understood by meteorologists. They are also called magnetic storms, because the magnetic needle is strongly affected during such electric manifestations. Their origin is supposed to be coincident with the development of auroras, and probably caused by disturbances in the sun that produce sun spots. Their coincidence has often been the subject of astronomical observation and record.—ED.]

Honor to Whom Honor, etc.

THE INVENTOR OF ARBOR DAY.

To the Editor of the Scientific American:

In the number of your paper for January 10, 1891, in an article on "American Forestry Congress," credit is given to B. G. Northrup, Esq., for the invention of Arbor Day, saying that Mr. Northrup "suggested" the idea of making such a holiday "eight years ago at St. Paul." Your article closes by the remark that the benefits derived and derivable from Arbor Day "entitle Mr. Northrup to be regarded as a national benefactor."

Truth compels me to ask a correction of your historical facts.

"Arbor Day" was invented by Hon. J. Sterling Morton, of Nebraska City, Nebraska. "At an annual meeting of the Nebraska State Board of Agriculture, held in the city of Lincoln, January 4, 1872, the Hon. J. Sterling Morton, of Nebraska City, introduced the following resolution, which was unanimously adopted:

"*Resolved*, That Wednesday, the 10th day of April, 1872, be and the same is hereby especially set apart and consecrated for tree planting in the State of Nebraska, and the State Board of Agriculture hereby names it Arbor Day," etc.; the balance of the resolution relating to prizes to the county and person planting properly the largest number of trees on that day.

More than one million trees were planted on the day named; and similar and increased results obtained in 1873. March 31, 1874, Governor Robert W. Farnas proclaimed April 8 as "Arbor Day," and requested the whole people of the State to observe it as a voluntary holiday.

Similar action was taken by succeeding governors until the session of the legislature of 1884–85 passed an act making April 22 of every year a legal holiday.

The State Board of Agriculture gives annual premiums about as follows:

Greatest number	$50
Next greatest	25
Greatest number hard wood	25
Greatest number of cuttings	10

A conservative estimate by the State Board gives the total number of trees planted under the operations of Arbor Day, between 1872 and 1888, as nearly *two thousand seven hundred and fifty millions*, a number which at only two feet apart each way would cover an area of nearly *eleven hundred square miles of land.*

Arbor Day has been adopted by other States. It should be by all. Besides its specific object—the encouragement of forestry in all its aspects—it is, quoting from a letter written by the author (inventor, as I call him), Hon. J. Sterling Morton, to the subscriber: "The only anniversary facing the future. All others turn to the past. Arbor Day blesses posterity, and leaves adulation of the ancients to birthday festivals."

I would not detract from any praise due to Mr. Northrup for his suggestion to extend the observance of Arbor Day; but the real honor of a suggestion which is to benefit not only the nation, but all mankind, in all justice belongs to the distinguished gentleman whose name has been given. AUG. F. HARVEY.

St. Louis, Mo.

DR. OTTO.—The death is announced of Dr. N. A. Otto, the inventor of the Otto gas engine. Dr. Otto died at Cologne, in his fifty-ninth year.

Notes on Quarrying.

WM. L. SAUNDERS.

The drill steel is, perhaps, the quarryman's closest companion during his hours of labor. Even where quarries are equipped with all modern conveniences, and whether or not the power drill is used, the drill steel always has its place. Hand drilling in rock is not as simple an operation as it appears to the uninitiated. It looks an easy thing for a man to stand up and shake a "jumper" between his toes, or to sit on a one-legged stool and drive a piece of steel with a hammer, but skill and experience are required to do effective work in either case.

I did not realize that there was much antagonism between the jumper and the hand drill, as it seemed to me that each one had its place, but I have recently talked with an intelligent quarryman whose experience has been confined largely to Europe and Australia, and he insists with much positiveness that the jumper can outdrill any hammer and steel system under any and all circumstances. It is doubtless true that the jumper is the most popular drill in the quarries of foreign countries. It is the standard hand rock drill, and its use among quarrymen extends to hard and soft stone alike and to deep and shallow holes; but with us the jumper has its place, and is only used where we find by experience that it is better to so use it as against any other device for the purpose. In several rocks, notably the oolites of Indiana and Kentucky, the jumper is the best hand rock drill. We use it in soft rock for all "down" holes, whether shallow or deep. Its simplicity is very much in its favor, and a man who has become skilled in its use can do more work at less expense in time and material than with a hand drill.

Where the rock is as hard as granite it is difficult to start holes well with the jumper. Quarrymen abroad become so skilled with it that they are able to guide it with considerable accuracy in starting holes; but at best a jumper cannot compete with the hammer drill in putting in shallow plug and feather holes in hard rock. Where deep holes are put in, it is best to start with a hammer until the hole is several feet deep and then use the jumper, as the effect of the hammer blow in drilling rock is very much lessened by the distance between the point where the steel is struck and the bit. In the case of the jumper the reverse is true, that is, the deeper the hole, the more effective is the blow because the steel is heavier. The "drop drill," such as is used for artesian well boring, is an illustration on a large scale of the principle of the jumper. A drop drill strikes with considerable force. In deep well boring, where a heavy piece of steel is used, the blow is greater than that of the largest steam drill. This is because the drop drill is heavier and moves through more space, that is, it has a longer stroke. The advantage which the steam drill has is that it strikes faster.

The steel consumed in drilling is seldom taken into account when figuring on the expense of quarrying. When using hand drills with hammers the consumption in steel is twice as great as when using the jumper or as when drilling by power. This is because the hammered steel wears at both ends. As a general thing the loss of steel is equally as great on the head as on the bit. In the case of power drills the loss is entirely at the bit. Several years ago I removed about five thousand cubic yards of rock by submarine blasting and lost three hundred and ninety-five pounds of steel by abrasion and dressing. This amount is not excessive when compared with sandstone quarrying, where the bits are rapidly worn by the grit. It is greater than would be the case in ordinary limestone quarrying, because submarine work involves many difficulties, and the proportion of holes drilled to rock removed is greater than in surface quarrying.

Let no one be deluded by those who claim to furnish machine hand rock drills. There is no such thing at the present time as a successful hand drill other than a jumper or a piece of steel struck by a hammer. The Patent Office records testify to the misguided enthusiasm of inventors in no more conspicuous manner than in the exhibit of hand rock drill patents. There have been, perhaps, as many patents taken out on hand rock drills as on power drills. In every case the inventor aims at something beyond the limits of reason. He seeks to do more work with a machine in the hands of a human being than that person is capable of performing. He seems to labor under the impression that a machine creates power, when, as a matter of fact, it only utilizes, distributes, or transmits power. Every person is gifted by nature with a certain capacity for work. He cannot exceed that capacity. He is limited by power, which is represented by strength, and by time, which is represented by endurance. In other words, he is like a lever which may lift a heavy weight slowly or a light weight rapidly, but in each case the weight and the time when multiplied together give a result which is the same.

A man when drilling by hand is the source of power, just as the boiler is the source of power for a steam drill. In order to get the full measure of power out of a man when drilling rock, his method of work should be simplified as much as possible. His movements should be easy and natural. There should be as little machinery and as little friction as possible. Give him a piece of steel and a hammer, and he has not only the simplest equipment for the work, but in wielding the hammer he follows natural laws, and is able to stand greater endurance.

A man may chop wood with an ax for hours without stopping, but in turning the crank of a grindstone he must pause for rest. Some men have invented hand rock drills with this view, and have complicated them by levers in an effort to get the natural motion of a man, but they forget that any machine when run by a man reduces that man's capacity for work.

A sewing machine has been instanced by those who doubt the truth of these arguments. A sewing machine enables a person to do more work than he otherwise could do, because the kind of work is such that it does not call for his full energy, and the way it is done is such that he cannot do it fast enough. The machine enables him to utilize more of his energy. But the case of drilling rock is different. It requires force. In order to make progress in hard rock we must give a hard blow. The progress in depth of hole drilled is in direct proportion to the strength of blows multiplied by the number of blows dealt per minute. If a man swings a heavy sledge he hits a harder blow, but there will be less of them. With a light sledge he strikes more rapidly, but in each case, provided the light blow is heavy enough to do work, and provided the man uses his full capacity for work, the net result will be the same.—*Stone.*

PHOTOGRAPHIC NOTES.

Obtaining Warm Brown Tones on Bromide Paper or Lantern Slides.—Two formulæ given by Mr. Robert Talbot in the *Photographische Neuheiten*, the author states, have proved to be very successful in his hands:

1. With uranium nitrate. This method is very well suited for Eastman positive paper, as well as for transferrotype paper. After the prints have been fixed, washed, and eventually transferred, the following two solutions are prepared:

Solution A.

Ferricyanide of potassium	5 grammes.
Water	500 c. c.

Solution B.

Uranium nitrate	5 grammes.
Water	500 c. c.

Just before use, equal parts of solutions A and B are mixed. The print is immersed in the solution until the desired tone has been obtained, then washed thoroughly, and placed once more in the fixing bath:

Water	100 c. c.
Hyposulphite of soda	20 grammes.

After five minutes it is removed and well washed. The above gives warm red tones. Warm brown tones are obtained if the print is allowed to remain in the above bath until it begins to acquire a brown color; it is then immersed in a weak alum solution, when it is rinsed, fixed as above, and again thoroughly washed.

2. With potassium chloride. Three solutions are prepared:

Solution A.

Water	1,000 c. c.
Potassium oxalate	330 grammes.

Solution B.

Water	1,000 c. c.
Potassium chloride	130 grammes.

Solution C.

Water	500 c. c.
Sulphate of iron	24 grammes.
Citric acid	2 "
Potassium bromide	2 "

The paper should be fully exposed, and then soaked in clean water. Then mix:

Solution A	20 c. c.
" B	5 "
" C	5 "

The more of B is taken, the browner will be the tone. The print is cleared, fixed, and washed as usual.—*H. E. Gunther, in Photo. News.*

Life Insurance.

The prime thing desired by any one paying money for life insurance is a sense of absolute surety that the amount called for by the policy will be promptly paid when it becomes due. With vast resources, and with a successful record of now nearly half a century in the business, the New York Life Insurance Company is in a position to satisfy the applicant for life insurance that the conditions of any contract with the company will be faithfully carried out. The forty-sixth annual report of the company, a summary of which appears on another page, presents a striking picture of its great strength and steady prosperity. It affords also the best of evidence of the careful management of resources as large as are involved in the conduct of many of the governments of the world. Over one hundred thousand people availed themselves of the care of the company during the year 1890. Over thirteen million dollars were paid to policy holders during the year, and it is said that the company carries about fifteen per cent of all the insurance in force in American companies.