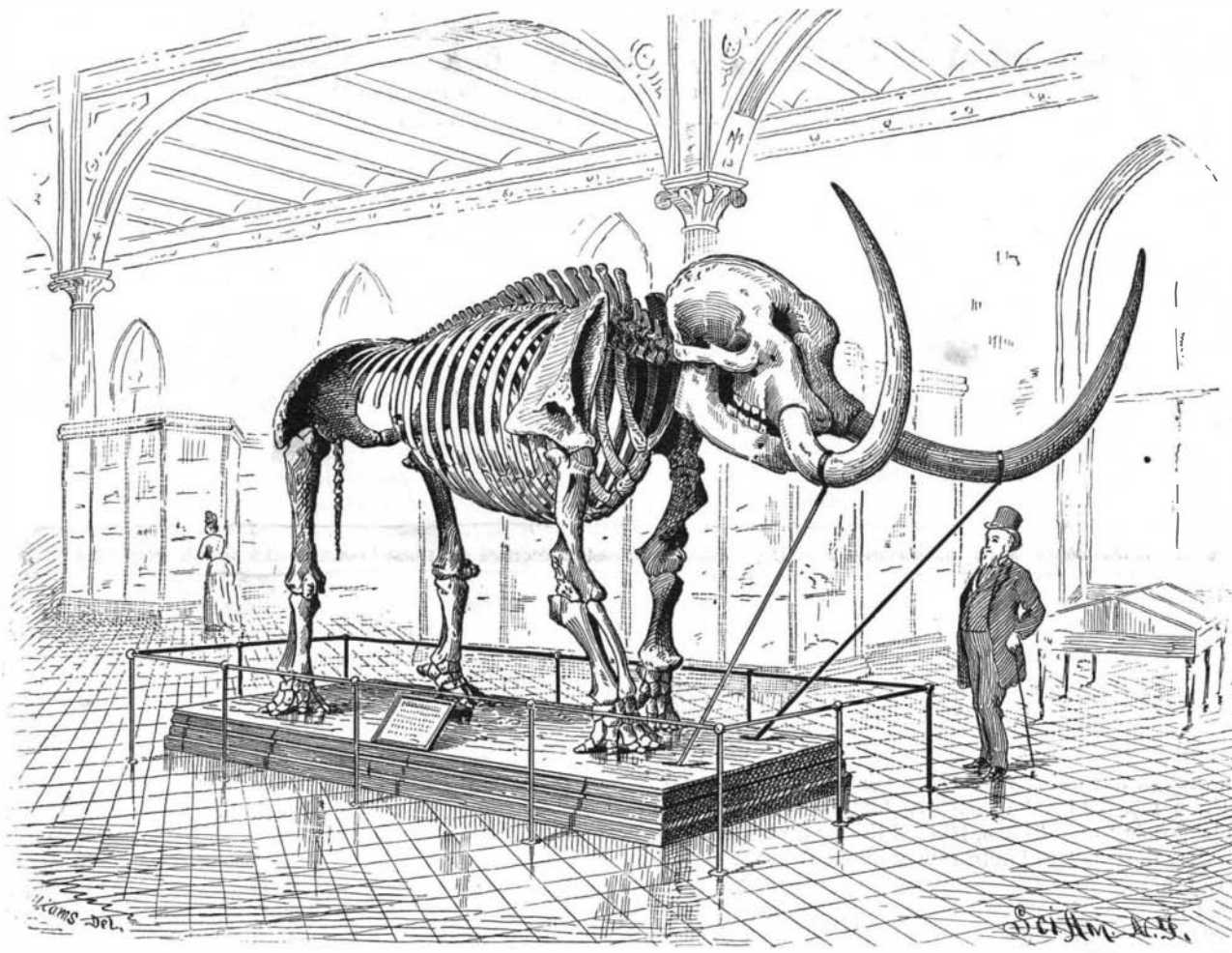
the principal *Fourgon poste* lines, with so much success that in a short time a number more was ordered, similar to that engraved. The engines are on the compound system, 12 horse power, working with an average pressure of 175 lb. on the square inch. They are mounted on two laminated locomotive springs under each axle. They are running regularly between two large towns in the south of France, 70 miles apart. The goods are collected and packed in the wagon—which will carry about six tons—during the day and dispatched every evening. Consequently, the whole of the running is done in the night. Twelve hours are allowed for the journey of 70 miles, but out of this about three hours must be deducted for stoppages at various places *en route* to take up and put down merchandise. The average running speed is, therefore, about 8 miles per hour. The road for about 30 miles of its entire length is fairly straight and through a comparatively level country. For the remaining 40 miles it is very hilly, the gradients varying up to as much as 1 in 11, while some are as much as 3 to 4 miles long. For miles the road winds along a shelving side of the mountains, without any protection whatever on the low side, while at another part it descends a zigzag course down to the bottom of a very steep valley.

In consequence of the dangerous nature of the road, it is of the greatest consequence that the engines should be fitted with ample brake power and an efficient system of lighting. They are therefore fitted with a steam brake—worked by McLaren's patent steam reducing valve—as well as the ordinary hand brake. The former can be applied instantly with such force as to pull the engine up with full steam on, and at the same time, by means of a chain, the brake is also applied to the wheels of the wagon. In the experimental engine it was found impossible to make lamps which could be relied upon, so the new engines have all been fitted with an arrangement for burning ordinary gas. This is compressed into a receiver up to 175 pounds pressure, and reduced down to burning pressure by means of a patent regulator or diminishing valve, which Messrs. McLaren specially designed for this purpose. One charging of gas is sufficient to give a brilliant headlight and supply the signal lights for the round trip of 140 miles. The water tank capacity is sufficient for twenty-five miles, so that, with a fill-up before starting, it is only necessary to take up water twice *en route*.

When the roads are in fair condition, 10 cwt. of fuel suffices for the round journey; a little more is required in bad weather. The weight of the engine empty is 13½ tons; loaded up with coal and water, 15 tons. The wagon weighs 2½ tons, and the load from 5 tons to 7 tons, so that the average total weight of the train is about 23 tons. The service is a daily one from each end, so that one engine leaves each terminus each evening with its load and goes straight through with it. A reserve of engine power is always available, so that ample opportunities exist for washing out, cleaning, and repairs. The average mileage of each engine is about 15,000 miles per annum. The engines in question have been running for over six months without a hitch or breakdown, and the system is admitted by all to be a complete success.—*The Engineer*.



MASTODON GIGANTEUS—FOUND NEAR NEWBURG, N. Y.

THE MASTODON GIGANTEUS (*Cuvier*).

BY DR. J. B. HOLDER, AMERICAN MUSEUM, CENTRAL PARK.

The mastodon, that great fossil mammal, allied somewhat nearly to the elephant, has become, perhaps, more familar to the public than any other of the numerous great creatures which once lived in our extended country. This familiarity came about through the frequent discovery of well preserved skeletons of the mastodon.

In nearly every State west of New England portions of this creature have been disinterred. And every year there are several found, more or less in a state of complete preservation. The circumstance of several examples having about them evidences of man's work is extremely interesting. On one account it brings the date, though greatly indefinite, to man's existence. We are, therefore, able to say, man and mastodon are contemporaneous. But the date is obscure. We have not determined what sort of man made those stone arrowheads which struck the life out from the great carcasses and lie among their remains. We have not a knowledge of what sort of man made the charcoal which was found lying among the partly burnt bones of a mastodon near the Mississippi River. But we do know that some man made the arrowheads. And we know also that no other than man is capable of making charcoal, or even to make fire by which it is formed. We are then able to say that the mastodon, like the fossil elephant of America, lived in the period allotted to man, while the marvelous great skeletons of extinct mammals, which have also been found in the Western "Bad Lands," are of more ancient date, being of the Miocene and other ancient deposits.

The most perfect, and also the most remarkable, as to size and interesting developments, is the skeleton of a mastodon now mounted in the Geological Hall of the American Museum of Natural History, in Central Park. This example, of which our engraving is a correct picture, was found embedded in a peaty material in the town of Salisbury Mills, near Newburg, N. Y. At the time of the discovery of these bones, in 1877, the locality was cultivated as a potato field. It was, fifty years since, a pond hole of considerable size. In digging a ditch about 20 inches deep, in order to drain the pond, at the depth of 14 inches the workman came upon a hard substance, which proved to be one of the long bones of the mastodon.

Prof. Whitfield, of the geological department of the American Museum, in company with Major Brooks, of Newburg, visited the place of discovery. He found the situation to be "a swamp, bordered on the side nearest the position of the skeleton by a low hill of 'bowlder clay,' a hard, blue clay, mixed with gravel, which slopes down and passes under the peat or muck of the swamp, and forms the original bottom of the pond. Every evidence, as has usually been noticed in other examples, was in proof of the animal's extinction by miring."

This skeleton is regarded as the most perfect of mounted ones known. This is a gratifying circumstance, as the greater number which have been removed from their burial places have proved to be greatly decayed. Often the upper side of the great creature is much decayed, owing to the nearness of the bones to the surface.

The only skeleton now in museums which compares to the present one in perfection is that famous one—the Dr. Warren example—which was found in 1845, near Newburg, N. Y.

In the present specimen the tusks were so injured that two others were substituted. The latter belong to the skeleton the only other portion of which is a lower jaw. This jaw is on exhibition with the skeleton, and exhibits the two remarkable under tusks which are known to exist at early age. These lower jaw tusks are obsolescent, being only about six inches in length. In most mandibles of the mastodon which are extant there is more or less of remaining alveolar development, which shows that at some period the creature had the mandible tusks fully grown.

The great tusks which are used in the skeleton to replace the decayed ones which were found with it are from an example found in Hoopstown, Illinois.

The dimensions of this skeleton are as follows:

Extreme length	18 feet.
Exclusive of tusks	14 "
Width of pelvis	5 "

It is the purpose of the American Museum trustees to mount alongside this mastodon the skeleton of the great elephant which Mr. Barnum lost by the late fire. This will afford an opportunity to compare the bones of the largest of Asiatic elephants with a large mastodon. It is well known that the African elephant has some near affinities to the latter, and in the near future a good example of that species will be added to the group.

The elephant as contrasted with the mastodon shows at once a greater height and shorter body. This is very considerable. Perhaps the next important comparison is in the aspect of the fore limbs. In the elephant the fore limbs are columnar, as are the hind limbs. In the mastodon there is a decided aspect more or less of prehensile capacity (as it were), that is, the latter have the fore feet approaching the plantigrade in aspect, and the limbs correspondingly adapted for pronation and the opposite. Of course this is slight, but shows the difference in probable habits. The fore limbs of the mastodon, with such development, we should expect, would be able to be thrown over low foliage or brushwood, and a crushing effected by the somewhat expanded manus. No such movement could be effected by *Elephas*. As much as we naturally compare the two great creatures, and especially as both have similar nasal developments, a near view of both together shows many differences in form.

The teeth are usually spoken of as constituting strong characters. The molars of the mammoth, with projecting, strong tubercular ridges, resemble the teats of a cow. The Greek *mastos*, a breast, being the root, hence mastodon, *mastos* and *odontos*, breast-toothed, or nipple-toothed.

The latter named kind of teeth are manifestly for crushing the coarse vegetable matter; and this corresponds to the probable uses of the fore limbs in crushing down shrubbry. The elephant, we see, grinds his food as the horse does. Both creatures, however, have the proboscis, and probably use that member similarly.

The first notice of the finding of the remains of a mastodon is found in the Transactions of the Royal Society of London, in the year 1714. Here is a short article in which is stated that a letter from Cotton Mather, of Boston, New England, to Dr. John Woodward, gives a description of some large bones which were found in 1705 at Claverack, in New York State, near Albany. Nothing further appeared until 1740, when De Longueil, a French traveler, discovered some bones at the Salt Lick, in Ohio.

To Cuvier we are indebted for the first intelligent accounts. Until 1801, little was known of the perfect skeleton. At that time Mr. Peale, of Philadelphia, obtained and set up in his museum an example which was found in Orange County, N. Y. In 1840, Mr. Koch found one on the banks of the Missouri River. It is now in the British Museum. Some specimens, single bones, have been taken up in Connecticut, along the Farmington River. The great river which separates New England from New York seems to have been a partial barrier to the passage east of the great beasts.

It is gratifying that, though New York City has not had the privilege of exhibiting a good skeleton of the

mastodon since the days of Peale's museum, it has now the best example yet known. The great frame of bones, as it stands in the Geological Hall, is truly an imposing and impressive example of mammal osteology, and well repays a visit.

Wages and Living Forty Years Ago.

The Springfield *Republican* publishes a portion of the address of James Bartlett, an old citizen of Detroit, at the semi-centennial of Michigan. Mr. Bartlett is an intelligent workingman and no rhapsodist. He had long been a machinist in Massachusetts when young, and spoke of things within his own knowledge. His own recollection went back forty-five years, for he first began in 1842, in a machine shop employing about fifty men on cotton machinery for Lowell. He said:

"The wages of a machinist in this shop were $1 to $1.25 a day; one nabob of a pattern maker received the sum of $1.50. They went to work at 5 o'clock in the morning and worked until 7:30 at night, with an hour for breakfast and three-quarters for dinner. It was several years before we obtained eleven hours a day. It has now been ten hours a day for twenty-five years or more, and we grumble at that, though we may get more than twice the wages we did forty years ago; and we are hoping to get the same or higher pay for working eight hours. I know the condition of the machinist is better then when I first joined the guild. He has better pay, better houses, better education, better living; and I hope he will keep on improving for the next fifty years. Large machine shops were started before 1836. One in Lowell employed over 1,000 men on cotton machinery. Now the country is dotted with them. For my part, I don't want any more of the good old times. The present time is the best we have ever had, though I hope not the best we shall ever see. In fifty years we have reduced our hours of labor from fourteen to eight hours a day, our wages are doubled, and the necessaries of life are much cheaper (a barrel of salt, which cost $3.50 years ago, has been sold in Michigan for 75 cents). The great curse of drunkenness is very much diminished. We live in better houses, better warmed and lighted, and we are better clothed; a high school education is in the reach of every child; books are free to all; the poorest laborer who meets with an accident in our streets will receive surgical aid that no king could purchase fifty years ago. Our great railroads distribute the fruits of labor so that famines are impossible. Beef killed on the prairie is sent all over the country, and supplies the markets of Europe. Fish from the salt seas and from our great lakes are eaten fresh all over the continent, and tropical fruits are peddled round all our streets."

Electrical Litigation.

The year 1887 closes with a considerable amount of litigation going on in connection with electrical patents, although few, if any, cases of importance have been concluded during the year. At the time of writing, the Supreme Court has not delivered its decision in the Bell telephone cases, although it has been anxiously expected for the last three months by the various parties in interest. The long delay would seem, if anything, to be an indication that the court will affirm the validity of the patents. If a sufficient defense were found among the many urged by the various defendants, it would not be necessary to consider other points at length; whereas, in preparing an opinion sustaining the patents, the court might consider every point carefully and at length, a proceeding which, in view of the enormous volume of evidence, would necessarily occupy much time.

The suit of the Western Union against the Baltimore and Ohio Telegraph Company for infringement of the Stearns condenser patent is likely to be terminated by a decree by consent of defendants—a result which, in view of the recent union of the two companies, can hardly be said to be unexpected. It is reported that Mr. Van Hoevenbergh, late electrician of the Baltimore and Ohio, who was made a defendant to the suit, has not yet consented to the decree—a circumstance which may have the effect of prolonging the litigation.

The numerous suits brought by the Edison Electric Light Company against the United States, Westinghouse, Consolidated, and other companies engaged in incandescent electric lighting, have apparently made but little progress during the year. In most of these cases the defendants have filed pleas, alleging that the Edison patents have expired, and that the present Edison company, which, it will be remembered, was formed by the consolidation of the original company with some of its sub-companies, has no legal standing in the present litigation.

The suit of the Thomson-Houston against the American Electric Manufacturing Company, alleging infringement of Professor Thomson's patent for automatic regulator for arc light dynamos, is in progress, a considerable amount of testimony having been taken.

The suit brought by the Brush company against certain users of apparatus of the Fort Wayne Jenney Company for infringement of the Brush arc lamp patents has been vigorously contested. The testimony has been completed, and the case having been argued early in December, is now awaiting decision.

The suits brought by the United States Electric Lighting Company against the Edison company, alleging infringement upon Farmer's patent for regulating apparatus for multiple arc circuits, are making slow progress, the testimony for the defense being yet unfinished.

Two suits have been instituted by the Westinghouse Electric Company on the Gaulard & Gibbs patent for induction lighting by alternate currents, one against the Sun Electric Company, of Woburn, Mass., in which the evidence has been completed and the case prepared for argument, and the other against the United States Illuminating Company, of New York, in which no evidence has yet been taken.

Another action for infringement, which has been commenced, but in which no evidence has been taken, is that of the Consolidated Electric Light Company against the McKeesport, Pennsylvania, Light Company. This is a very important case, as it is designed to determine the validity of the Sawyer-Man patent claiming the exclusive right to the incandescent filament of carbonized fiber, which is employed by the Edison company as well as by most other manufacturers of incandescent lamps.

An action has also been commenced by the Brush company against the Faraday Carbon Company, of Pittsburg, alleging infringement of Brush's patent for copper plated carbons. A suit on the same subject was commenced by it some years ago against the United States Company, but was dropped and never brought to an issue. A movement is said to be on foot among the manufacturers of carbon points to make common cause with the Faraday company in its defense.

Quite a number of other suits of minor importance are now pending in the courts in which electrical devices are involved, but the above list comprises the most important ones. It is probable that the present year will be marked by the decision of a number of important patent cases, which will have a marked influence upon the future direction of electrical development.—*Electrical Engineer.*

Natural Gas.

The gas field of Murrysville is one of the wonders of the world. One hundred and twenty-five wells within a radius of one mile are pouring forth a volume of gas that is marvelous. Frank L. Stewart, the best posted man on the subject in the United States, says that there is no perceptible diminution of the flow from the wells—that each well, on an average, produces daily from 50,000,000′ to 75,000,000′. Taking 60,000,000′ as an average, and multiplying that by 125, and the daily product of gas is 7,500,000,000′. There are now fifteen gas pipe lines down, conveying the element to as many different points. From the fact that the flow is so immense, and the pressure is so evenly maintained, the conclusion is reached that there must be a constant generation of gas going on beneath the earth's crust. The report has been once and again set afloat that this or that well was giving out, but the gentleman above referred to says that in every instance it has been found that the decreased pressure was caused by some obstruction in the tubing, and that, having withdrawn the casing and put down the bit, the flow has been restored to its original pressure. With such a gas field in our midst, the material development of Western Pennsylvania must be unprecedented.—*Saltsburg Press.*

Millerstown, Pa., December 23, 1887.—This town had a narrow escape from a wholesale holocaust at about 10:30 o'clock, Wednesday night, the 28th. The cause was natural gas. At the hour named the citizens who had not yet retired were startled by their lights and fires suddenly springing up a distance of a foot or so. This was immediately followed by an additional rush, and the lights leaped to the ceiling in an instant. The stoves roared liked furnaces, and the wildest excitement ensued. People rushed through the streets warning their neighbors, and but for the prompt action taken, the town would certainly have been destroyed, and no doubt several lives would have been sacrificed. The surplus gas was caused by the ball on the safety valve of the gasometer being either taken off or falling off, thereby throwing the entire pressure of the well on the service lines. This pressure was no less than ninety pounds, and perhaps more. This terrible pressure was thrown on at every house, and as almost every one had left the gas burning, it is a miracle that there was no one burned out. This is only attributed to the time it occurred, for had it been two hours later, nothing could have saved the town. There was a high wind blowing, and the cold was severe. Men ran through the various streets to the public school building, churches, and other places, and in most cases were compelled to break in the doors. After the excitement was over the people returned to their homes, but many of them were so frightened that they slept in the cold rather than to relight the gas.

An enthusiastic correspondent writes from Kokomo, Ind.:

The Schrader is the second in power of any gas well yet discovered. It has a pressure of 340 pounds to the square inch, discharging 10,000,000′ of gas each twenty-four hours. An iron tube 3″ in diameter resting on braces about 6′ high is first seen by the visitor. It looks as harmless and quiet as the dead iron. No one would dream that sleeping dormant within this little space is a power that awes the stoutest heart and blanches the rosiest cheek when the screw is turned and the match is applied, notwithstanding the observer has been warned "not to get frightened when the full force is turned on." In a flash the blaze shoots 70′ high, with a width of fully 15′; the roar is heard for miles around, and the very air and the earth tremble as if in the giant grasp of a visible divinity. There is no language to exactly describe the noise made by this newly discovered agent of nature that enriches all and makes no one the poorer. I have stood at the foot of old Vesuvius and witnessed her eternal fires, but the grandeur of the volcano pales into insignificance before the power, majesty, and beauty of the Schrader well. It is worth a trip across the continent to witness the lighting of this at night. It is a Niagara of fire. Notwithstanding the city is largely heated and lighted by this well, and immense factories furnished with motive power, it does not seem to decrease the volume one iota. The gas-heated house has solved the domestic problem as to who shall build the morning fire, for the laziest married man on earth is equal to scratching a match, no matter how low the thermometer may be, and this is all that is required in the city of Kokomo.

The New Gold Fields of South Australia.

In his report to the Department of State, United States Consular Agent J. W. Smith writes from Port Adelaide as follows:

The most important and noteworthy circumstance which has occurred in South Australia during the past year is the discovery of a rich alluvial deposit of gold about 230 miles north of Adelaide, and within 20 miles of the railway line, now nearly completed, to the rich silver district across the New South Wales border, and known as Silverton. The existence of gold in the neighborhood of the recent discovery has long been known, and a reef of ironstone and quartz, yielding gold in payable quantities, from 17 pennyweights to 1¼ ounces per ton of stone, has for many years been worked 15 miles to the west of the newly found alluvial. The place is called the Teetulpa gold fields, from the name of the sheep run on which it is situated.

The account here given of it has been furnished by Mr. I. B. Austin, a recognized authority on mining matters in the colony, and who has for ten or twelve years been acquainted with this part of the country as an auriferous district. Shortly after the alluvial discovery was made public he visited the locality, so that much of the information is given from his personal observation. Notwithstanding the fact that gold reefs had been worked for years within a few miles of the place, and some prospecting done with the view of finding alluvial gold, the discovery was made quite accidentally. Two men, who had been searching for gold and were camping at a "dam" or water reservoir with some others, went in search of their horse, which had strayed, and while looking for it a thunder storm came on. The rain washed away some of the soil in a small creek, exposing to view two or three nuggets of gold. The party fossicked them out with three or four more, and after waiting, with the digger's usual caution, until the other men had gone away, they proceeded to open up the ground, which they found so rich that they at once applied to the warden of the gold fields for a prospector's claim and the reward of £1,000 offered by government for the discovery of a new and payable gold field. A rush speedily took place, and a number of nuggets were found in the little dry creek, some only two or three inches from the surface and some in the crevices of slate rock.

In about a fortnight from the announcement of the discovery it was estimated that 2,000 men were on the field. No washing was attempted for the first fortnight, all the gold being picked out of the dry and friable loamy soil and gravelly wash dirt. Two boys got out 3 ounces in two days; four men got 16 ounces of rough, nuggety gold in one week; one man got 18 ounces in eight days; four men got 30 ounces in one week. The pieces varied in weight from half a pennyweight up to several ounces (3, 5, and 6 ounces), and one of 8 ounces 14 pennyweights was also found. Since then several nuggets have been found, weighing, stated roughly, without being exact to pennyweights and grains, 10 ounces, 10½ ounces, 11½ ounces, 12, 13, 16, 18, and 29¾ ounces, all fully authenticated, and more than one from 7 ounces to 12 ounces. Besides these there is a report of one weighing over 61 ounces, which, not so undoubtedly confirmed as the others, is nevertheless stated on excellent authority to be genuine.

QUEEN VICTORIA is to receive the first bar of gold taken from the newly discovered Gwynfynydd Mine at Dolgelly, Wales.