by two or three locomotives. The regular snow plows are all of the pattern designed for "bucking," the rotary plow being unknown in England. The heaviest English plows do not exceed thirty tons.

A problem kindred to that of snow fighting, namely, battling with ice, is presented each winter to those American railroads in the vicinity of the Great Lakes, the track systems of which are divided by some portion of the inland waterways. For instance, whole trains of freight and passenger cars are ferried across the Detroit River at Detroit, and across the Straits of Mackinac in northern Michigan, while an even longer link is found on Lake Erie, where "car ferries" operate the year round between Conneaut, Ohio, and a port on the Canadian shore opposite. Solid fields of ice are frequently encountered by these vessels, and they are compelled to plow their way through the frozen fields.

The plan employed for breaking up the ice in the pathway of one of these powerful steamers, especially constructed for the purpose, is a modification of the idea exemplified in the rotary snow plows. Propellers are fitted at the front of the vessel as well as at the rear, and the rapid revolution of these screws results in a violent agitation of the water, which, exerting an upward pressure on the expanse of ice, rends it asunder. This same fundamental plan has been adopted in the case of the famous Russian ice-breaking steamer "Ermak," designed to keep open during the winter some of the more northerly ports of Russia, and in the case of the car ferries which form connecting links in the Trans-Siberian Railway, just as do the similar vessels operated by American railroads having termini on the Great Lakes. The largest of these Russian ice-breaking car ferries will accommodate but twenty-five loaded cars, while the American ferries of the largest size will each accommodate about thirty-four cars.

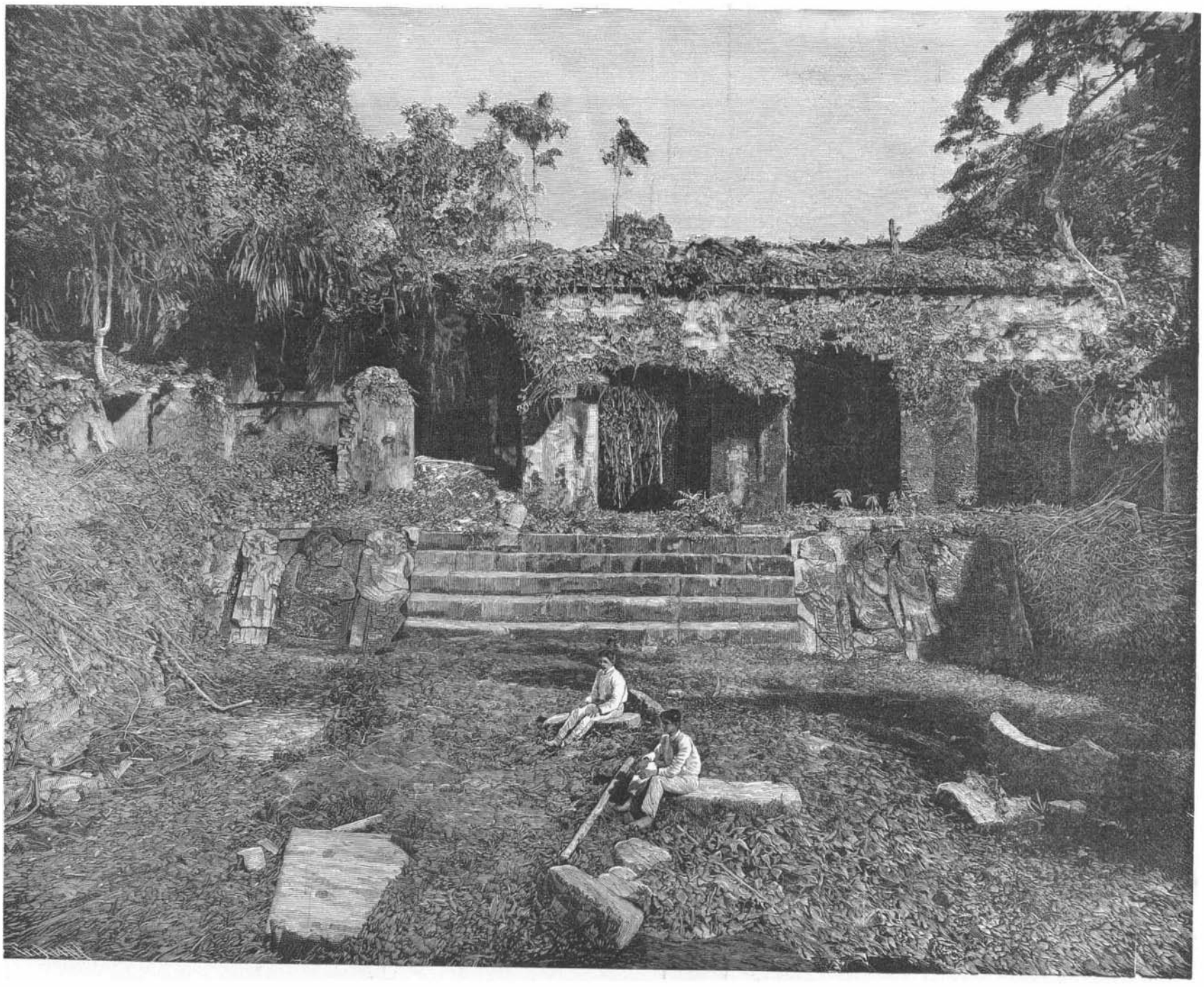
A perhaps more commonplace but not less important phase of the removal of obstacles to transportation is found in the clearing of the streets of a city after a heavy fall of snow. The methods followed in New York city, where any interruption to traffic would be especially disastrous to the commercial interests of the entire country, are especially interesting. As many as 10,000 men have been engaged at one time in removing the snow from the streets of the metropolis. An average snow storm costs the city at least $75,000. When the fall approximates, say, 400,000 cubic yards, as many as 3,600 extra shovelers are employed, and fully 3,000 carts and trucks are brought into service for the removal of the snow. In all large cities the street railway companies are required to remove the snow from the tracks, and usually from the pavement for a certain distance on each side of the track. As a rule, the street railway lines make use of wedge-shaped scraper-like plows, supplemented in many cases by large power sweepers.

A CARVING FROM THE RUINS OF PALENKE.

THE ANCIENT RUINS OF PALENKE.

BY ENOS BROWN.

A traveler who recently visited the famous ruins at Palenke, State of Chiapas, Mexico, laments the changes which time and the elements are gradually making in their appearance and condition. Nothing has ever been done by the Federal Government to preserve these impressive monuments of the highly cultured race who constructed them and of whose history and origin but little is known. The climate of the region in which the ruins are situated is the direct opposite of that of Egypt, inasmuch as the rainfall at Palenke has been known to amount to 200 inches a year. The air is humid and encourages decay and at the same time stimulates the rapid growth of the vines and creeping plants, which are disintegrating the walls and pavements and will eventually level them to the ground. So dense is the foliage surrounding the ruins, that light from the sun is almost totally obscured. The photographer who was employed by the Mexican government to take pictures of the ruins could accomplish his object in some instances only by means of a flash light. The ruins of Palenke are about 200 miles from the port of Frontera and are reached by steamer up the Tabasco River to San Juan Bautista and thence by trail. The group all lie within a radius of 2,000 feet, and consist of nine distinct structures, of which the "palace" is the largest and most central. The ruined buildings consist of temples, pyramids, aqueducts, and edifices whose purpose is not yet ascertained. The temple is the largest of all, and upon it the ancient builders lavished all their art. It includes a court and balconies, as well as great corridors in which tablets in bass-relief are fastened into the walls. Sculptures representing battle scenes and events of the nation's life are carefully depicted. From them the physical characteristics and domestic habits may be correctly ascertained. The dimensions of the "palace" are great. Its length is 238 feet, and breadth 180 feet, and it is elevated on a mound 310 feet long, 260 feet wide, and 40 feet high. The material used was stone, many blocks of prodigious size being used, and all joined together with mortar. As great architectural ability was displayed by the builders of the edifices at Palenke as was shown by the architects who erected those of the Nile. How it was possible for a primitive people to fashion, convey, and sculpture such



THE RUINED TEMPLE OF PALENKE.

immense stones as were employed is the wonder of modern archæologists. It would seem that the same people were the builders of these structures found at Milta, Mayapan, Tula, as well as at Palenke, a race which covered Yucatan and the Southern States of Mexico with mighty temples.

A French scientist with a lively imagination and unusual powers of observation credits the "Toltecs" with building these ancient temples, and fixes the seventh century as the period of their erection, but these confident assertions are doubted. Others place the era in which they were built as early as the date of the pyramids of Egypt. However, it seems to be proved beyond a doubt that many centuries before the discovery of America these ruins were in existence. It is not believed that Cortez or those with him knew of the Palenke ruins, though that conqueror must have been close to them at one time. Europeans first heard of them in 1750, but it was not until 1787 that they were explored. The key unlocking the mysteries hidden in the hieroglyphics which are carved on hundreds of tablets may some time be discovered, and the history of a great race of people and their origin be known, but their successors who now inhabit the region have no traditions that can aid the inquirer.

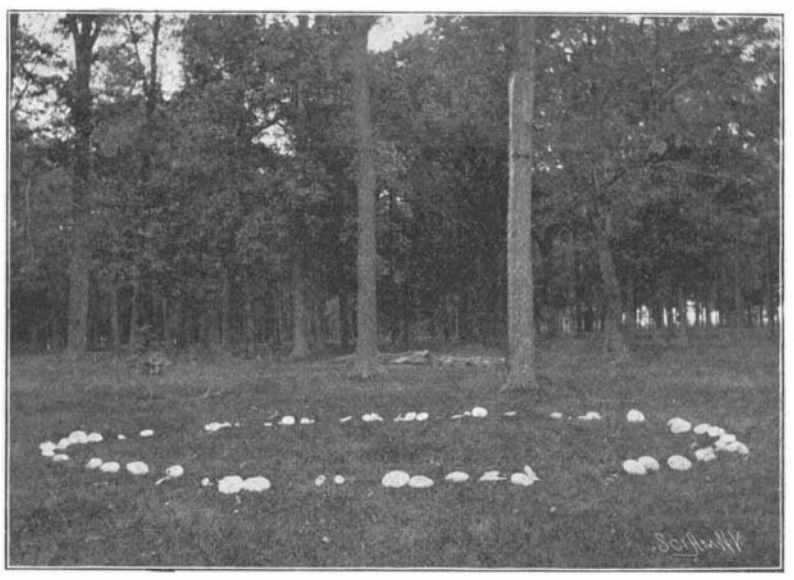
The ruins of Palenke should be preserved, and the Mexican government owe that much to the world. If it were possible to clear the timber away and destroy the growth of vines which is rapidly overwhelming them, these interesting relics might be saved for the future. They have so far resisted the effects of time and physical convulsion, but must eventually succumb to the ceaseless, persistent, and silent assaults of an overwhelming tropical growth.

A CURIOUS MUSHROOM GROWTH.

Prof. F. S. Lamar, who fills the chair of biology at Wilmington College, Wilmington, Ohio, sends us the accompanying picture of a colony of eighty mushrooms growing in a circle, twenty-four feet in diameter. A few had been trampled down by pasturing cattle, so that the picture reveals many a gap which would otherwise be filled.

In the wooded pastures where this circle of mushrooms was found, about four miles from Wilmington College, Wilmington, Ohio, were several other circles, some larger than this one, but not so well preserved at the time Prof. Lamar took the picture. Some of the fungi illustrated measured ten inches across the top.

Prof. Lamar explains this curious phenomenon by stating that since mushrooms derive their nutriment from organic matter, they soon exhaust the soil in which they grow. The spores that fall within this exhausted area must, therefore, perish. Hence, where one mushroom grew one year a group may grow the following. The soil will then become exhausted within this area, and the next year, if conditions are favorable, a circle of mushrooms will be produced. Thus, year after year, the circle will increase in diameter. Rarely, indeed, however, is a circle produced so large and so geometrically perfect as that illustrated.



A CURIOUS MUSHROOM GROWTH.

Prof. Lingle's Study of Life.

About a year ago, it will be remembered, Prof. Jacques Loeb startled the scientific world by his statement that the vital force of life comes from the electric forces and the food which is eaten, and not from heat. Prof. David J. Lingle, also of the University of Chicago, now steps to the fore with an equally startling announcement. He states that it is not only salt, or sodium chloride, which stimulates and causes heart action, but that oxygen gas is often a more important factor in sustaining heart action. While experimenting with a strip of turtle's heart which he was moving from a vessel containing sodium chloride, he noticed that the beating of the strip was greatly increased when it came into contact with the air. Noting this, he experimented with a piece of the ventricle of a turtle's heart. When it ceased to beat he put it in a solution of salt, and then put the strip into a jar of oxygen gas. Here the beating was sustained for seventy-two hours.

News is received from abroad that the Allgemeine Elektricitaets Gesellschaft has formed a combination with the Union Elektricitaets Gesellschaft, capitalized at $85,000,000. The step is the result of a crisis in the German electrical industry. After the sudden rise in electrical industries, it was found that the manufacturing capacity had far outrun the market's demands; it was therefore decided to organize a combination after the American practice. Various attempts were made by the Allgemeine Elektricitaets Gesellschaft to form an organization, but the other companies demanded too high a rating in the combination. With the alliance thus formed there is only one great rival firm left to compete with, and that is Siemens and Halske.

How the Scientific American Frustrated a Perpetual-Motion Fraud.

In the issue of the Scientific American of July 1, 1899, we published an article in which a typical perpetual-motion fraud was exposed. The machine there described was exhibited by one J. M. Aldrich, and on the strength of its wonderful performances he obtained no little money from those who desired to secure an interest in its commercial introduction. But the fact that the motor, so far from running perpetually, revealed a tendency to slow up now and then, raised such suspicion that Aldrich was arrested and detained for some three or four months in a jail. The model was afterward sent to the Patent Office, where the perpetual motion was traced to its time-honored source—a concealed spring.

Prof. G. P. Singer, of Lock Haven, Pa., sends us a clipping from a local paper in which a kindred fraud came near being perpetrated. It was due primarily to the fact that Prof. Singer is blessed with a good memory, and is a careful reader of the Scientific American, that no one in Lock Haven became a victim. From all accounts it seems that a certain Thomas Burnett came to town with a machine, to all intents and purposes, similar to that described in the Scientific American. Burnett exhibited his device to all who cared to see it. Apparently it operated faultlessly; indeed, so faultlessly that there was a movement to form a company for the purpose of exploiting it. But the citizens of Lock Haven were more cautious than some of the victims of Aldrich, and requested Prof. Singer to examine the invention. That gentleman did so. As soon as he saw the device, he recalled the machine described in the Scientific American. Upon returning to his residence he made a search for his papers, and after a three hours' search found the issue for which he was looking. Prof. Singer lost no time in giving his information to the men contemplating the organization of the company. Burnett, when confronted with the copy of the Scientific American, indignantly refused to take his machine apart in order that all might see that there was nothing concealed in the thick wooden base upon which the operating parts were mounted. That night he left the city.

Marconi Sends Messages Across the Atlantic.

It is now authoritatively announced by Marconi, himself, that wireless messages have been transmitted between the Old and the New World. Messages were sent from Lord Minto, Governor-General of Canada, and from Marconi, to King Edward. Messages were likewise sent to the King of Italy, by Marconi and by Commander Martino of the Italian cruiser "Carlo Alberto"; other messages were from Dr. Parkin to the London Times, and from Richard Cartwright of Canada to the Times.

The message to the King of England read as follows:

"To Lord Knollys, Buckingham Palace, London:

"On the occasion of the first wireless telegraphic communication across the Atlantic Ocean may I be permitted to present by means of this wireless message, transmitted from Canada to England, my respectful homage to his Majesty the King? Marconi."

The message to the King from the Earl of Minto read:

"To his Majesty the King, London:

"May I be permitted by means of this wireless message to congratulate your Majesty on the success of Marconi's great invention, connecting England and Canada? Minto."

The following message by wireless telegraphy was received from the King of Italy by Signor Marconi in reply o the inventor's transatlantic marconigram:

"I learn with the keenest pleasure of the great results you have achieved. They constitute a fresh triumph for you to the greater glory of Italian science.

"Victor Emmanuel."

Marconi states that it was about a month ago that he succeeded in transmitting messages from Table Head to Cornwall. First, the messages were all in code and were simple queries, such as "How is this?"

In many respects this achievement of Marconi is fully equal to that of Cyrus Field in opening communication between America and England by means of the submarine cable. But the distance covered by Marconi is greater than that over which the first submarine cable extended, by about 300 miles. So far as practical results are concerned, the Anglo-Italian inventor may well be regarded as the pioneer of commercial wireless telegraphy. Where others have failed he has succeeded.

Where Telephoning is Cheap.

In no country in Europe does the telephone play so important a part in the daily life of the people as in Sweden, and in no country, with the exception of the United States, has the telephone been brought to such a pitch of perfection. There are two classes of telephones in use, the "Riks," or government variety, and the "Allmänna," or general. These latter are subdivided into three further varieties: The "star" telephone, which costs $25 per annum; the ordinary telephone at $2.50 a year for five years after installation, plus $15 per annum for use (after five years, however, the $2.50 a year ceases); the third variety is the "district," which costs only $10 a year. The cost of the Riks, or government telephone, is $14 a year. The toll rates are low. They are as follows:

Up to 60 miles outside Stockholm, 4 cents for every three minutes.

Over 60 to 150 miles, 8 cents for three minutes.

One hundred and fifty to 360 miles, 13½ cents for three minutes.

From 360 to 540 miles, 20 cents for three minutes.

Over 540 miles, 28 cents for three minutes.

It must be understood that these rates apply to Sweden only. In Norway the rates vary according to distance from 8 cents to 56 cents, and in Denmark from 41½ cents to 69½ cents for three minutes' conversation.

Now, with regard to the Allmänna, or "general" telephone. Within a radius of 40 miles of Stockholm these instruments may be used free, but beyond this distance Riks must be used; and to connect with the Riks from your own Allmänna apparatus a charge of 2½ cents is made inside the city, while the ordinary Riks charges prevail outside. Accounts for transfers from one variety of instrument to another are rendered every quarter. The star and ordinary telephones may be used as often as you please, but the district variety is limited to a hundred calls in a quarter, after which 2½ cents is payable for each message. The star telephone is always found in the offices of big shops, so that the user of the ordinary district instrument can transact his business with merchants and tradespeople of every kind without in any way interfering with his own hundred quarterly conversations. Distracted users of the telephone will be interested to know that a reply is always forthcoming from the central station in about ten seconds.

The Current Supplement.

The current Supplement, No. 1409, contains a wide variety of articles of general scientific interest. Day Allen Willey describes the geysers of Yellowstone Park, and illustrates what he has to say with many a striking picture. The English correspondent of the Scientific American continues his discussion of water-tube boilers, his present installment dealing with the Yarrow boiler. Of electrical interest are the articles on electric meters and wireless telegraphy and the theory of the action of the coherer, as well as the storage battery invention. Much that is curious is told in an account of American Indian medical practice. A very full description of the making of oleomargarine will probably be welcomed. Dr. J. Gordon Parker discusses instructively the subject of leather for bookbinding. Mr. F. T. Jane concludes his entertaining account of a fictitious naval battle worked out by means of the war game which he has devised. The usual Trade Suggestions and Selected Formulæ will be found in their accustomed places.

Our Oldest Subscriber.

At this season of the year it is our custom to receive letters from subscribers who are renewing their subscriptions, stating that they believe themselves to be among the oldest living subscribers to the paper. It is an interesting question, and we would appreciate it if all who have been subscribers to the Scientific American for a period of twenty-five years or more would kindly write us to that effect, stating as far as possible the date at which they first subscribed to the paper.