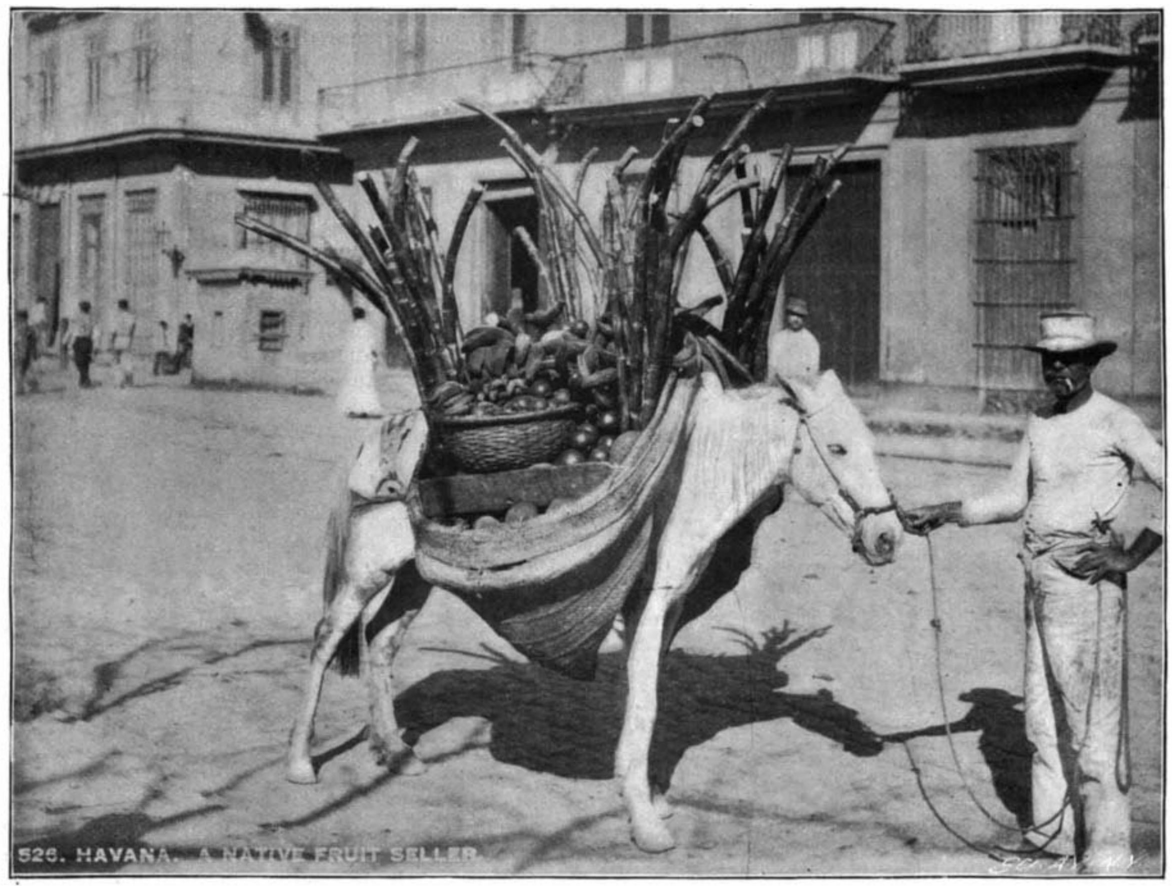
THE BANANA AS THE BASIS OF A NEW INDUSTRY.

The banana grows well in our new possessions in the West Indies, and we have no lack of delicious fruit which has great food value as well. Unfortunately, however, bananas do not stand long sea voyages, and the result is that a considerable market is closed to them. Bananas can, however, be dried and converted into a flour called "bananine," which may prove to be the basis of a very valuable industry. France, understanding the advantages it will be possible to derive from the banana plant, has sent a commission to the United States and Central America for the purpose of studying the banana industry upon the spot, and it has also been suggested by M. Charles Patin, of Belgium, who has investigated the subject, that the banana plant will prove the subject of important agricultural operations in the Congo and destined to produce cheap food for the working classes in Belgium. According to Humboldt the banana has forty-four times more nutritive value than the potato, and according to another authority on dietetics it is twenty-five times more so than good white bread. Since flour can be produced from it at less expense than that obtained from wheat, it is permissible to believe that the products of the banana plant will furnish the working classes of many countries with wholesome, nourishing food at the lowest possible cost. Bananas besides being nutritious are very easy to digest and may be used by the sick, since they are perfectly adapted to weak, delicate stomachs. The article is a direct product of the banana that has reached its complete development. The fruit is peeled by slitting the skin longitudinally and giving it a rotary motion with the hands. The peel having been thus detached the fruit is cut into thin transverse slices which are dried in the sun or in a furnace. It is then only necessary to bray or grind these slices in order to obtain a fine flour therefrom. In Central and South America hand mills are in use for grinding corn for corn bread, and such apparatus are admirably arranged for obtaining from the slices of banana either the banana meal or an impalpable flour made through simple grinding without any passage through a sieve.

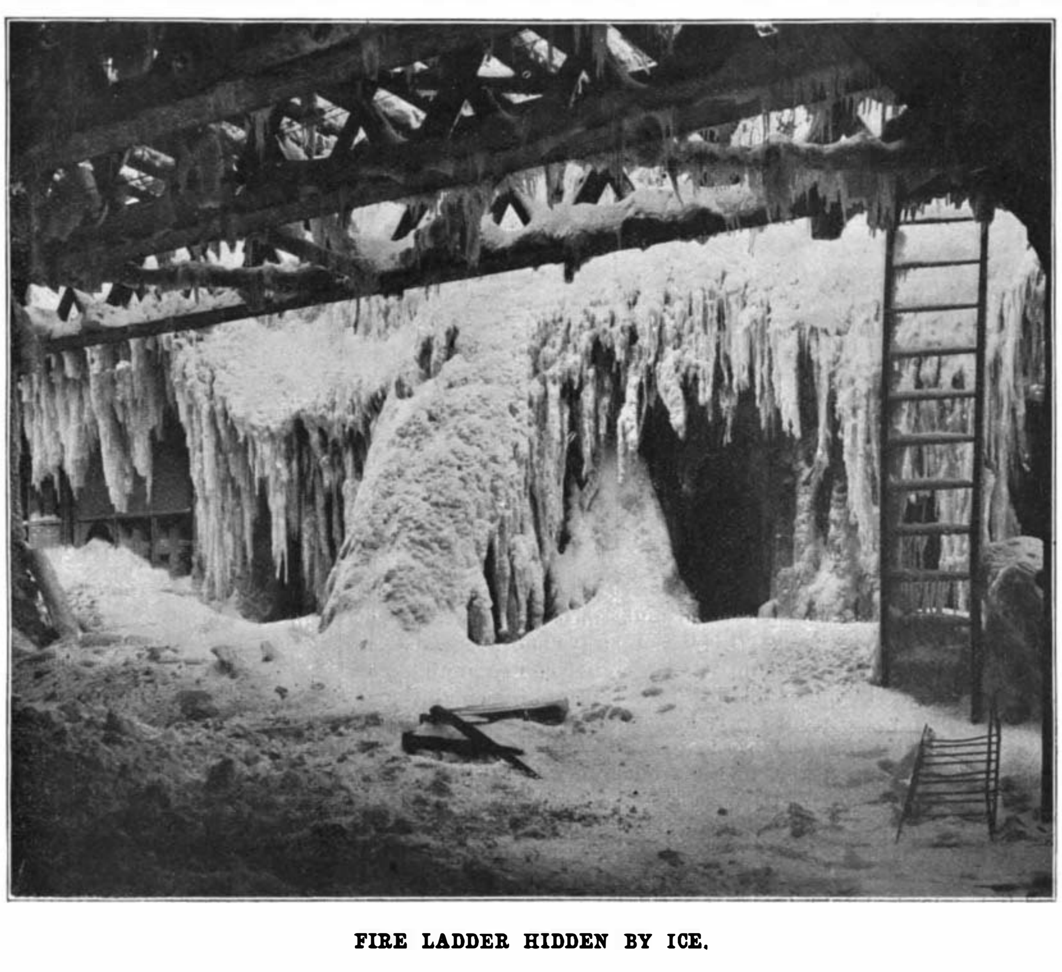
There is another branch of the banana industry; this is the drying of the plantain, which is done in the following manner. The bunches are gathered in quantity as they approach maturity and are suspended in a shed in order to allow the fruit to finish its ripening, say for four or five days, then the fruit is peeled and placed on mats and exposed to the sun. For the first two days the fruit is turned over every two hours, but after this they are turned only once a day. At the end of six or seven days they are sufficiently dry to be put into boxes or baskets like figs, or assorted according to their length, and are then put up in bundles, as is done with vanilla beans. These plantains, packed in boxes and wrapped in tin foil, may be preserved indefinitely. The flavor of the dry banana is somewhat strange at first, but the palate soon adapts itself to the taste.



THE BANANA TRADE IN CUBA.

A REMARKABLE FIRE IN NEW YORK.

There occurred on the morning of Thursday, February 9, a serious fire on South Street, New York city, involving a number of buildings and a loss of property estimated at about three-quarters of a million of dollars. Nearly all the buildings in the block bounded by Front, Moore, South, and Whitehall Streets were practically burned out. As soon as the firemen arrived at the scene they were convinced that it was a fire of great importance, and by ten o'clock all of the apparatus and firemen south of Twenty-fifth Street had been called out, and two fire boats were also hard at work. The fire was fanned by the wintry blast, threatening great damage, and it might have burned two or three blocks in that part of the city if it had not been for the great heroism of the firemen, who succeeded in limiting the conflagration to one block. Some of the buildings were nearly a hundred years old and were perfect fire traps, so that it was a most difficult operation to fight the fire successfully. All the time that the fire burned the water froze as it struck the buildings. The fronts were coated with ice, and from the cornices and window sills hung huge icicles which were frozen into the most fantastic shapes, as the wind had blown the water in process of freezing. The fire escapes on the fronts of the buildings supported icicles which were sometimes the height of an entire story. The ladders which the firemen had placed against the buildings when they first arrived were soon slanting pillars of ice, and there was no resemblance to a ladder left. The spaces between the rungs were frozen solid and the ladder was soon two or three times its original size. Each wire was covered with a coating of ice, and even the elevated structure in Front Street was incrusted with ice and long icicles depended from it. The firemen moved slowly around in the street below, carrying almost their weight in ice, and it is needless to say that they suffered severely, and those in active service had to be relieved at intervals. The fire boats, as the tide fell, were soon left aground, as they had come up very close to South Street, and they soon pumped streams of mud against the South Street buildings, and the muddy water hung down in dark chocolate brown icicles. The flag pole on South Ferry Hotel became so weighted with ice that it bent until the tough ash pole formed almost a semicircle. Firemen very seldom have to work under more discouraging conditions than those which existed at this fire, in which the temperature ranged from zero to two degrees above zero, and the northwest wind blowing at a velocity of thirty-six miles an hour. Our photographs were taken shortly after the fire, and show the front of one of the



FIRE LADDER HIDDEN BY ICE.

FRONT OF A BUILDING INCRUSTED WITH ICICLES.

buildings and also one of the ladders incrusted with icicles.

For the next ten days the firemen were constantly being called out. Over three hundred and fifty alarms were sent in within a few days, and the blizzard of February 13 and 14 made it almost impossible for the engines and other fire apparatus to get through the streets, and in some cases they were stalled. The firemen of New York deserve great credit for their heroic conduct during the severest test to which they have ever been put.

New Uses of Glass.

Early in October, 1898, a paving company of Lyons, France, began laying on the Rue de la République a piece of pavement of ceramo-crystal, ceramic stone, or devitrified glass. During the months of November and December of 1898 and thus far in January, 1899, this pavement has been driven over during all hours of the day and night. It has stood as hard usage as any pavement could be subjected to during that time, and is still in an admirable state of preservation. The glass, or ceramic stone, pavement is laid in the form of blocks, 8 inches square, each block containing sixteen parts in the form of checkers. These blocks are so closely fitted together that water cannot pass between them, and the whole pavement looks like one large checkerboard. Like all thoroughfares in France, the roadbed slopes gently to the walk on each side. Some of the edges of the checkers have been broken off during their three months' service. United States Consul Covert counted some twenty of them that have been slightly chipped on the edges. It is contended that this does not argue against the value of the material as a pavement, and that any kind of stone would have suffered just as much or more in the same time.

Mr. Covert visited the Ceramo-Crystal Manufacturing Company's works at the suburban village of Demi-Lune, about six miles from Lyons. The factories cover nearly 8,000 square yards of ground. Work is now stopped in them while additions are being made to the buildings in the shape of second stories. In the yards are many tons of broken bottles, which the superintendent told me was their "raw material." On the four sides of a large brick smokestack are specimens of ceramo-crystal for buildings and interior decoration, some of the pieces as smooth as highly polished marble, others being rough, like cut stone, and still others having a surface like common brick.

The advantages attributed to this ceramo-crystal by the manufacturers are: As a pavement, it has a greater resistance than stone; it is a poor conductor of heat, and ice will not form upon it readily; dirt will not accumulate upon it as easily as upon stone, and it will not retain microbes; it is more durable than stone and just as cheap. The Central Architectural Society of France made a report recently on this ceramic stone.

This subject is being discussed in the press and is receiving general consideration. An elaborate and exhaustive article in the Revue des Deux Mondes for November treated the question under the heading of "A glass house," the writer asserting that a large house constructed entirely of glass would be an attractive feature of the coming world's exposition in 1900. He said that glass could be used for tubes, pipes, vats, tiles, smokestacks for factories, and for buildings. Double glass walls in a house would admit of the circulation between them of cold or warm air, thus regulating the temperature.

The glass house, or the luminous palace, which it has been decided to build on the grounds of the 1900 exposition, is now being constructed.

The Electric Fuse.

ALTAN D. ADAMS.

Incandescent light and electric power are commonly distributed from what are known as constant pressure circuits.

The distinct feature of constant pressure circuits is that a uniform electric pressure, measured in volts, is maintained between the wires to which lamp and motors are attached.

Now, the fundamental formula governing the flow of electric currents in any conductor, measured in amperes, is that the amperes equal the volts between the ends of any conductor, as a lamp or motor, divided by the electric resistance of the conductor measured in ohms.

Expressed as a fraction, above rule becomes

$$\text{amperes} = \frac{\text{volts}}{\text{ohms}}$$

It is evident from the relation just stated that when the volts remain constant, as in constant pressure circuits, the amperes flowing through any circuit will be very great when the resistance of the circuit in ohms is very small.

For example, the pressure of the ordinary lighting circuit for incandescent lamps is 110 volts; if a conductor is connected to the wires, which has a resistance of 110 ohms, the resisting current in the conductor will be one ampere; if the conductor has resistance of 1 ohm, the current will be 110 amperes; and if the resistance is one-tenth ohm, the resulting current will be 1,100 amperes.

The heat developed in any conductor depends on the number of amperes flowing, and if the amperes are sufficiently increased in any case, the conductor may be made red hot, white hot, or melted.

As the electric current is costly, we cannot afford to let much of it be wasted in heating conductors that produce no useful effect thereby, and we, consequently, proportion the wires of an electric circuit so that their resistance in ohms is small, and there is but little heat produced in them by the electric current.

Lamps and motors form most of the resistance of the electric circuit, and in them most of the heat is produced and work done.

Thus it is common to require electric wiring to be proportioned so as to have from 0·02 to 0·5 of the resistance of the lamps or motors attached to it, so that from 0·95 to 0·98 of the total electric energy is expended in the lamps and motors.

From the above it is evident that, should a lamp or motor with much less than the usual resistance be connected to the wiring, a very large current would flow through the wires, and the loss in them, and, consequently, their temperature, would be greater than intended.

Suppose again that, through some defect in a lamp or motor, or in the devices for connecting same, as switches and sockets, the service wires are connected by a resistance even less than their own.

A current in amperes ten, twenty, or even fifty times as great as intended may now flow through the wiring, heating it red hot or even melting it and setting fire to surrounding materials.

The enormous flow of current, corresponding to the slight resistance, takes place much quicker than one can think of it, and the first notice of any trouble may be the melting of a wire or the blaze of surrounding materials.

Experience has shown the dangers from a rush of electric current through an accidental low resistance connection between the wires to be so great as to absolutely prohibit the use of constant-pressure circuits without some device to interrupt or disconnect the wiring when a low resistance contact is made. The device almost universally employed to disconnect a circuit of electric wiring, when a connection of too low resistance occurs, is the electric fuse.

This fuse usually consists of an alloy of tin, formed into a thin strip and furnished at each end, in all but the smallest sizes, with a copper terminal adapted to go under a screw head. Fuses are proportioned to carry any desired number of amperes, and to melt, thus breaking the connection, a little beyond rated capacity. To confine the hot fuse metal when it melts, the fuse is mounted by clamp contacts on a block of porcelain or slate, and the block provided with a cover of slate, iron, or some incombustible material. Fuse blocks are inserted in the wiring at necessary points, the principle being that every part of the wiring must connect to the source of current through a fuse that will melt and break the connection before enough current flows to heat the wire to a dangerous point. The result of this arrangement is that near the dynamo, connecting it to large wires, carrying the entire current, are placed large fuses, perhaps of hundreds or even thousands of amperes capacity. As the dynamo is left behind, smaller wires are used, branching in various directions, and each connected to the larger wires through a fuse of the proper size, until, finally, a one ampere fuse may be used to protect the flexible card of a single lamp.

On the flow of too great a current, then, through any part of the wiring, the protecting fuse melts, instead of the wire, and disconnects the wiring where the fault exists, without damage. Two distinct advantages are gained through the use of fuses: First, the temperature of the molten metal is reduced from about 1930° Fahr., the fusing point of copper, to 442°, the fusing point of pure tin, or to even less than 200°, if some of the alloys of tin are used; second, the melted metal, instead of dropping at various points across a room, onto inflammable materials, is confined at one point, in an incombustible box, where it can do no harm.

The fuse can be replaced at once, for an insignificant sum, while, to replace a line of wire, would involve time and material expense. Fuses are sometimes supposed to be used for the protection of lamps and motors, but this is incorrect, as their main and primary purpose is to protect the wiring. It is impossible for a fuse to protect incandescent lamps to any definite extent, as, under greatly increased line pressure, the only possible case for the fuse to save lamps, the lamp filaments will usually break before the fuse blows. A fuse may sometimes protect a motor from continuous overload, but its use for this purpose is not very satisfactory. Some persons in charge of electric plants have been known to replace burned-out fuses with wire, nails, or strips of sheet iron; but consideration of the fire risk involved should insure for this practice the strongest condemnation.

A Fossil Plant from the Upper Devonian Strata.

The New York State Museum has recently added to its geologic collections one of the most remarkable fossils that has been unearthed in recent years. It is a fragment of a large fossil plant, about 12 feet in length, with an average cross section of 15 by 11 inches; the short diameter was perpendicular to the plane of bedding, and was probably caused by the pressure of the superincumbent rock. It was collected by J. Nelson Nevius, of the museum staff, from thin bedded, blue sandstone of the Hamilton group, near Monroe, Orange County, N. Y.

Both flattened surfaces show prominent transverse ridges, which evidently were the natural contour of the plant. The rounded surfaces are so badly weathered that it was impossible to collect several feet of them, but where they are in better condition they show that the ridges extend entirely around the trunk. These ridges are irregular in distribution, but average 4½ inches apart, with an amplitude—from the depression to the crest of the ridges—of 1¼ inches.

One end of the specimen includes the stumps of several branches. Before the specimen was removed from its bed, six branches were counted, all branching within a distance of 4 feet along the trunk. They were from 4 to 7 inches in diameter, and were so compressed that it was difficult to trace any particular one for a considerable distance, particularly as the compositions of the fossil and the surrounding rock are very similar. On the side of the excavation opposite that from which the specimen was taken, and 20 feet from the point where the branches diverged, the continuations of two branches were perfectly distinguishable on the face of the rock; the larger of which was 5½ inches in diameter, and of nearly circular cross-section.

The composition of the fossil varies considerably. The greater part of the interior of the trunk varies in no visible particular from the surrounding blue sandstone, and is homogeneous entirely across the trunk. At some places the center of the specimen is a crumbling mass of carbonaceous sand and impure limonite, while in other places the material is almost a quartzite. The latter condition prevails particularly in the branches, which usually show more of a cellular structure than is noticeable in the trunk. Many of the limbs are hollow, and have a tendency to fracture along the rings of growth.

Most of the exterior of the trunk was covered with a thin layer of limonitic, earthy material, having a fibrous appearance which suggested bark; a d many of the troughs between the ridges contained thin layers of soft coal. These materials were so fragile that the greater part of them was unavoidably destroyed in removing the specimen.

Thin sections of the plant, under the microscope, show a more marked cellular structure than is apparent to the eye.

Evidences of plant life abound in the sandstone and shale at this locality. Strata overlying those from which this plant was taken are filled with fragments of what appeared to be sea-weeds. At several localities the black, carbonaceous condition of the shale has led to considerable excavations in a search for coal, which is, of course, fruitless. Small quantities of shale, sufficiently carbonaceous to burn on a grate, have been found.

As no paleobotanist has yet studied this specimen its identity is unknown, but the consensus of opinion of those scientists who have seen it indicates that it is a gigantic sea-weed. It has been suggested that it may be the species described by Dawson as Celluloxylon primaevum, which Penhallow says is an alga, or sea-weed, and belongs to the genus Nematophycus, a synonym for Prototaxities, concerning which there is a difference of opinion as to whether it is a marine or a land form.

This specimen had lain exposed to the weather for some time, and upon being raised it fell into hundreds of fragments, which Mr. Nevius has reunited, and the entire specimen is nearly ready for exhibition in the museum, where it is already attracting much attention.

Whatever the family and genus of this plant may prove to be, it is extremely rare from the Hamilton group. Large trees were very abundant during the Carboniferous era, and fossils of them are common; but this specimen probably was in exactly its present condition ages before the vegetation of the Carboniferous era began.

THE time is undoubtedly coming very rapidly when the isolation of the farmer will become mitigated, owing to "neighborhood telephone lines," by means of which they can communicate with each other without reference to the condition of the roads or press of work. A local paper of an inland city in New York State describes an interesting line where the subscribers constructed the line, furnishing the tools and doing the work themselves, the expense for wire, instruments, etc., was equally divided among them, and the cost was only about $14 per share. The line, of course, is free to subscribers, but others can make use of it by the payment of a small fee. At present there are ten subscribers to the line.