Trial of the Langley Aeroplane.

On the afternoon of December 8, in a landlocked bay at Quantico, Md., with only fishermen for spectators, a trial was made of Prof. Langley's new aeroplane. For some time past preparations have been made for this trial in a workshop at the rear of the Smithsonian Institution, of which Mr. Langley is the honored secretary. Quantico is a village on the west side of the Potomac, about thirty miles from Washington. A small workshop has been installed on a scow which is anchored in the narrow channel between the mainland and an island. To the roof of this workshop the new machine is suspended. Quantico is admirably suited for experiments, as it is not likely to be frequented by inquisitive visitors. The shape of the new air ship is somewhat like that of a porpoise. The wings incline upward and the machine is suspended much as a kite is held in mid-air, only in place of the wind and strings are a pair of rapidly revolving screws. After experiments on different forms of motive power, Mr. Langley has decided that a light steam engine is preferable to the heavy storage battery.

The trial was conducted in a rain. The machinery was started and when the proper degree of tension was reached, it was released. The great aluminum bird, measuring ten feet from tip to tip of the wings, rose slowly in the face of the wind and sailed away for some distance. It then alighted upon the surface of the water, where it floated. It was picked up by a rowboat and brought to the scow.

Although the experiment was successful, much remains to be done to perfect the air ship, and to make it more dirigible. The aeroplane is subject to strange eccentricities of motion, and these must be guarded against before a long flight can be attempted. The world is watching with interest the experiments now being conducted by two American inventors, one in America, the other in England, Langley and Maxim. For four hundred years the minds of men have been occupied by the problems of aerial flight, and there now seems a good prospect of their practical solution before the close of the present century, especially when the experiments are conducted by men of such high standing. The time has arrived when the perennial jokes regarding "flying machine cranks" have lost their point.

Novel Music Boxes.

Among the Christmas novelties of the present season a number of very curious adaptations of the music box are to be found. The Swiss musical boxes are the most elaborate and ingenious. They come in all shapes and sizes. Beer mugs, for instance, are fitted with a false bottom containing a music box, so that a German may drink his beer to the music of the "Watch on the Rhine," and there are all sorts of musical flower pots, cigar temples, workboxes and artificial birds supplied with similar mechanisms. Perhaps the most curious form, however, are the musical statues and the model crucifix playing a Te Deum. Many forms of sacred relics may also be bought which play well known pieces of sacred music. These toys vary in price from $2 to $250, and some made especially to order bring much higher prices.

THE NEW MANHATTAN LIFE BUILDING

THE MANHATTAN LIFE BUILDING.

We publish in this issue illustrations of the Manhattan Life Insurance Co., another of the buildings of extraordinary height which are gradually transforming the appearance of this city. In its construction it represents the most advanced type of steel frame construction, and in putting down its foundations the pneumatic system with steel caissons was applied for the first time to the foundations of an office building.

It rises 347 feet above the sidewalk, and its foundations go down 53 feet below the same level, which brings them 20 feet below tide water level, making a total of 400 feet. This building is probably the highest office building in the world, and some idea of its enormous altitude may be obtained by comparing it with some of the well-known types of high building construction. The Masonic Temple, in Chicago, is 302 feet high above the curb; Trinity Church spire, in New York, for a long time the highest pinnacle in the city, is only 284 feet high; the statue of Liberty, in the harbor of New York, rises 301¼ feet from the water level; the dome of the Capitol at Washington is 288 feet high. It is only by such comparisons that the height of this building can be realized.

The architects were Messrs. Kimball & Thompson, of this city. The front, of granite, is of beautiful design, which is well brought out in our cut. The rear, on New Street, is of buff brick, and the exposed side walls, of red brick, have been painted to correspond. Our thanks are due to the firm for many courtesies extended.

The foundations, which consist of fifteen masonry piers, are carried by the same number of steel caissons. The latter were sunk to bedrock by the pneumatic process. One of our cuts illustrates an interesting phase of the work, in which an air blast, caused by the outrush of air through a pipe connected with the interior of the caisson, acted as an elevator and forced out the material excavated by the shovels of the workmen. The loose material was shoveled into a receiving chamber or funnel, and the ordinary air pressure in the lock carried it up to the surface of the ground, where it was free to be carried away in the usual way.

The caissons, after reaching the desired level and after the rockbed had been cleaned, were filled with a concrete, consisting of 1 part of Portland cement, 2 parts of sand, and 4 parts of broken stone. The brick piers, which were built upon the caisson as it descended, were laid in a mortar consisting of 1 part of cement and 2 parts of sand.

The front of the building, made of solid granite, is practically self-sustaining, while most of the rest of the building is carried by the steel frame, which includes 32 columns distributed over the 15 masonry piers. The calculation of strength is such that every square foot of the floors and of the roof could be loaded with a weight of 175 pounds and the building still be within its factor of safety. This factor is a very liberal one, being placed at one-third the ultimate strength.

In its foundation we find a very extensive use of the cantilever system. This feature is shown in the large cut, where the foundation trusses are seen carrying the columns. The side wall columns rest upon the outer ends of the cantilevers, whose fulcra are some seven feet back from the side walls of the building. The enormous weight of the building, which, when empty, excluding foundations, is placed at 60,000,000 pounds, necessitated the use of enormous cantilevers and trusses, among them being twelve 88 ton cantilevers and one 39 ton girder. The mere story of the transport of the great girder through the streets by a team of forty horses, the truck rolling over a specially laid track to prevent destruction of the pavement, is of interest. The great cantilevers were transported in 22 ton sections, which were put together on the ground. In the frame, 5,800 tons of iron and steel were used, including about three-quarters of a million of rivets and bolts.

In its erection very remarkable results in rapid construction were attained. In less than five months the foundations were completed, and three months sufficed for the steel frame to reach the roof level. The exact figures of its weight give an interesting relation between the weight of a building and that of its floor loads. If every floor were fully loaded, 5,000,000 pounds, or 8⅓ per cent of the original weight of the building, would be added to it. In other words, it represents one of those structures which if strong enough to carry itself can carry all the living load that can be placed within or upon it.

The columns were made in lengths covering three stories and averaged about fifteen tons in weight. The steam derricks used for raising the frame pieces were so powerful that when a truck load of the smaller parts reached the building, a chain sling was put around the entire truck load and the whole was hoisted at once.

A gratifying feature of the work was that it was done without the loss of a single life.

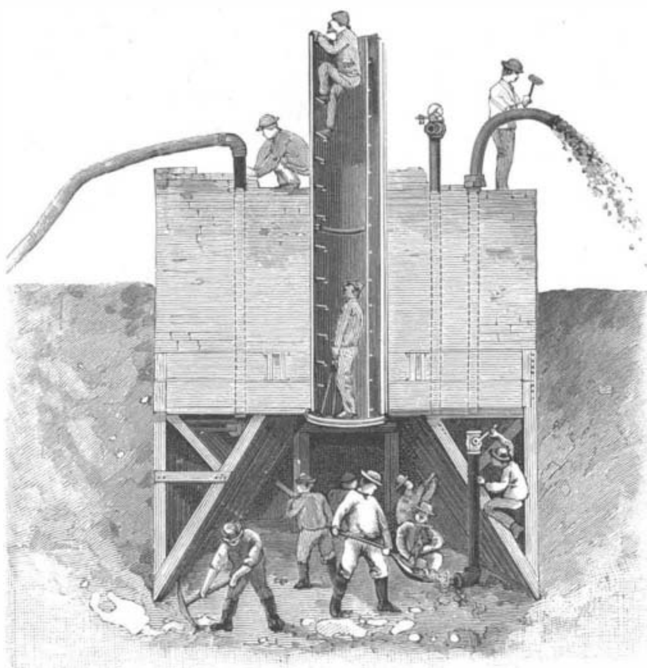
One of our cuts shows the wind bracing in the dome. The dome is made on a steel frame whose rafters are braced by short diagonal tension rods with a turn-buckle in the center of each rod, so that the whole can be set up as tight as desired.

The main steel frame stops a little short of the extreme top; above it the light copper and steel structure rises to the apparent foot of the flagstaff. This staff takes all its support from the steel frame, and is quite disconnected from the light work immediately surrounding it. A finial acting as a rain shield encircles the staff at its base, forming, apparently, a portion of the cupola.

As the great height of the building exposes a large surface above its neighbors, it is subjected to a considerable wind pressure, and this has been most carefully investigated. Within its factor of safety the dome is calculated to bear a wind pressure of 50 pounds per square foot and the rest of the building one of 30 pounds per square foot, the latter pressure being enough to blow a railroad car off the track. Here again the factor of safety is so large that it is utterly impossible for possible wind pressures to have any effect on it whatever.

The tower at its base rests upon the roof, which by concrete filling on corrugated steel flooring transmits wind strains through the entire structure and outer framework to the foundation. Double angle iron knee braces are used at the connection of columns and girders to insure stiffness. Even the turning moment of the building has been calculated, and it has been found that its stability considered as a rigid structure is seven times greater than the highest overturning stress which the wind could bring to bear upon it.

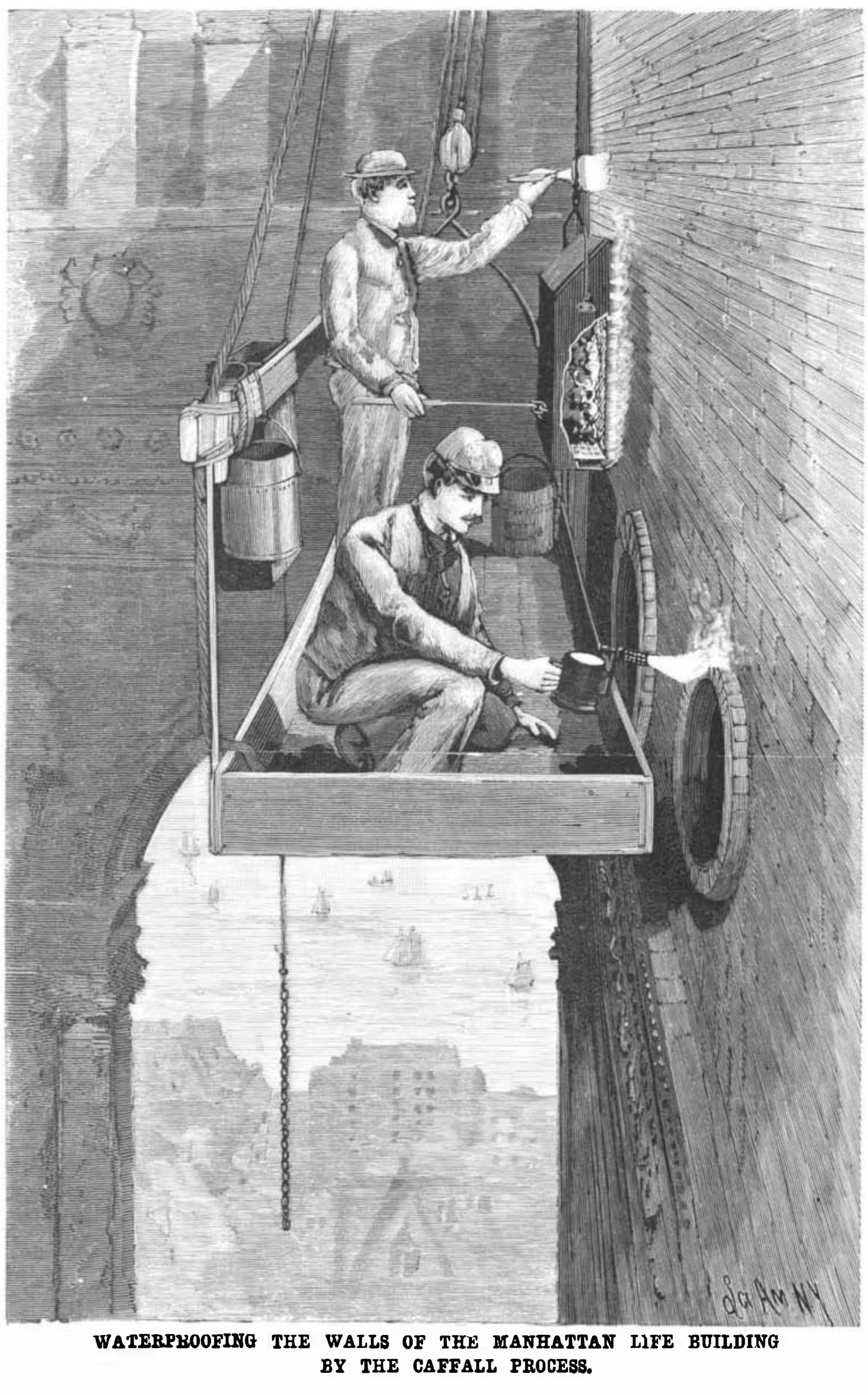
The interior work is of the finest description. The mosaic floors, embodying some very complicated work, deserve particular mention. There is an Indian chief's face just within the entrance which ranks as a work of art. The design work in mosaic is executed by pasting the pieces of colored marble face down upon a piece of paper on which the design is drawn.



EXPELLING EXCAVATED MATERIAL FROM A CAISSON BY THE AIR BLAST.

These are then set in the cement on the floor, paper side upward, and are finally polished, the paper being washed off. We have not space to even summarize the other items of the interior work.

One of the most interesting and important operations in the construction of the Manhattan Life building is the waterproofing of the brickwork, as executed by the Stone and Brick Waterproofing Company, 132 Nassau Street, New York. The readers of the SCIENTIFIC AMERICAN will recall our descriptions of the Caffall waterproofing process, which has been applied to the Central Park obelisk, and has there proved completely successful in preserving the stone from disintegration by the extremes of the American climate.



WATERPROOFING THE WALLS OF THE MANHATTAN LIFE BUILDING BY THE CAFFALL PROCESS.

We illustrate in this issue the Caffall process as applied to the Manhattan Life building. The wall surface is first heated and then melted paraffine is applied before it cools. For the flat surfaces the workman is provided with a sheet iron stove, supplied with charcoal. This is held with its face against the wall, and as the charcoal burns it heats the portion in front of it to about the temperature of boiling water. The workman has at hand a pot of melted paraffine wax. This he applies by a brush to the heated bricks, constantly moving the furnace and working on the heated portion. The hot bricks absorb the melted paraffine rapidly and are thereby rendered impervious to moisture, and after the treatment no vegetable growth can appear upon them. The interior of the building will be far drier than it would be were the bricks used in their natural state.

In the Manhattan Life building some of the brick were buff colored and others were red. The latter had to be painted and the Caffall process was applied to red and buff alike, for it has been found to be an admirable preliminary for painting operations, as brick thus treated absorb paint far less greedily than do the natural brick, and as the paraffine excludes the possibility of alkaline matter from the cement exuding from the pores of the brick, the oils of the paint are prevented from saponification. The mechanical action of such salts is also prevented.

Paraffine is, of all chemical substances, one of the most difficult to decompose, except by very high heat. It is one of the most water repellent substances known, so that brick or stone, whose pores are filled with it, is in the best possible condition to resist moisture permanently. It has been found that years of exposure have no effect upon the preparation. While the stoveful of burning charcoal is very hot, the walls treated are but slightly heated thereby. A temperature of but 200 degrees is required for the process, and any such temperature will not affect the most fragile stone. Very exhaustive tests have been applied by scientists to determine whether any injury can be done to building stone by its application, and it has been found that no injury was done, and the idea that high heat in this process was applied to the stone has been found to be fictitious. In places about a building where the large, flat-face stove cannot reach, the blast lamp or blow-pipe is used, and in the cut one of the workmen is shown using this instrument. The cut also shows the construction of the stove with open front and suspended from a pulley with a counterpoise. A little shelf or ash pan is secured below the perforated bottom of the stove to catch any ashes. There is a handle by which the stove is moved about from place to place. The melted paraffine is applied to the portion of the bricks just heated. The first application of the paraffine darkens the color of some stones. For such cases a process is subsequently applied which restores perfectly the original color.

A VALUABLE geological map of Alabama has been published by the Geological Survey of the State. The map is large, the details are clearly drawn, and the whole will be found very satisfactory. The various geological formations are indicated by different colors, and can be traced with great accuracy. The map is based upon recent surveys, and free use has been made of the Atlas of the United States Geological Survey. A valuable feature is the large chart accompanying the map. This gives much valuable information concerning the fossils of the State, the thickness, area, and distribution of the soils, the useful mineral products, the character of timber growth, and other similar information, together with the names of the reports in which a more detailed account of these features may be found.

The Sorghum Industry.

The season for manufacturing sorghum sirup and sugar is over, and although exact results of the campaign cannot be stated until the products have been entirely disposed of, yet it is possible now to consider the present state of the sorghum industry.

Sorghum manufacture consists in making sirup and also sugar. It is a common error to measure the sorghum industry simply by its yield of sugar. The value of the sorghum sirup product of the country is greater than the value of the sorghum sugar. In small factories sirup only is produced, and in large factories sirup, sugar and molasses are produced. The sorghum crop is of sufficient importance in twenty-four States to be reported monthly by the government statistician, along with sugar cane, rice, wheat, corn, and other leading crops of the country.

The season for sorg um manufacture usually begins in August. At that season sugar cane sirup is not found in market. There is, then, a general demand for "new crop sirup." At the beginning of the season the sirup factories find a home market for their product, and the sugar factories use quantities of cane which is not fully ripe in the manufacture of sirup.

The beet sugar factories and the sorghum sugar factories have a considerable advantage in the fact that there is usually an active demand for sugar in the months of August and September for use in preserving fruits. As a rule sugar brings a higher price in those months than it brings in the months in which Louisiana sugar is marketed. And sorghum has an advantage over beet manufacture in the fact that it is possible to make a fine sorghum sirup during the months when the market is bare of sirup, or whenever sirup pays better than sugar. Sugar refiners utilize a part of the residues of sugar refining by converting them into sirup, and it is said that there is sometimes more profit in the sirup made from the residues than in the refined sugar, for the reason that sirup sometimes brings a relatively higher price than sugar. It seems probable that, for a time, the production of fine uncrystallizable sirup will form a considerable part of the output of sorghum sugar factories, and that only the best cane, which alone is profitable for sugar manufacture, will be worked for sugar, and that unripe canes at the beginning of the season, inferior cane during the season, and frosted cane at the end of the season, will be worked for fine sirup, as the inferior residues of sugar refining are worked for fine sirup. So far the sorghum sugar factories have worked mainly for raw sugar, and incidentally for crude sirup. The result has been a small yield of sugar per ton of cane worked for sugar, a large yield of molasses which includes a considerable amount of sugar which cannot be extracted profitably, and inferior sirup which requires the manipulations of the "mixers" to fit it for use. It is not difficult to make a fine, uncrystallizable sirup from sorghum, which is superior for many purposes, if not for all, to the common mixed sirups. Considering the immense sale of mixed sirups, there seems to be room for a sirup which can be produced at a low cost and which is superior to the mixed sirups. There seems to be little profit in producing an inferior quality of sirup which is wanted only by mixers, as there is little profit in producing articles of low grade in any line. The sorghum sugar factories have produced a larger quantity of sirup this season than usual, and until the processes of sorghum sugar manufacture are improved so as to produce more sugar and less molasses, it seems better that only high test canes should be worked for sugar and that inferior canes should be worked for sirup. At present it is much easier to improve the manufacture of sirup than it is to immediately improve the extraction of sugar from molasses. The latter is a problem which long troubled sugar cane and beet sugar manufacturers, and it requires time for the sorghum industry to work out that problem, as it required time in the sugar cane and the sugar beet industries. While an increase in sugar yield is and should be the main object of the sorghum sugar factories, yet while accomplishing that object it seems necessary to utilize the cane in the best possible way with regard to immediate financial results.

The working of the sorghum sugar factories this season presented a striking contrast with the working of the earlier sorghum factories. The business management was better, the machinery worked smoothly, the processes of manufacture were performed more efficiently, expenses were less. The season's work showed the value of experience and of trained help, both of which were sadly needed in the earlier days of sorghum sugar manufacture.

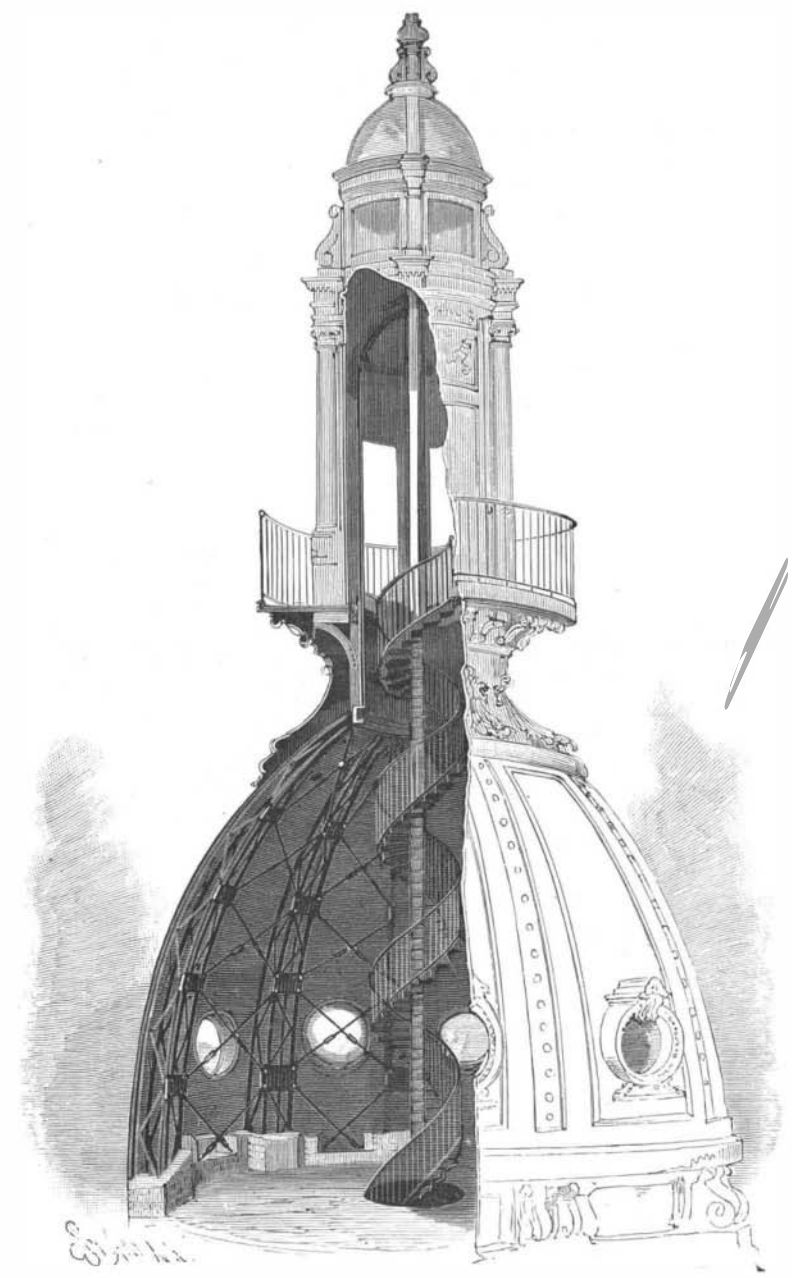
The general depression of business, the removal of the bounty on sugar, and the low prices of sugar affect the sorghum industry, as they also affect the sugar cane and beet manufacture, but never before in the history of the sorghum industry have so many plans been evolved at this early time in the season for improving and enlarging future work in sorghum manufacture. Those who are most concerned in the industry, and who know its needs best, confidently believe that if the sorghum industry can have the protection it should have for a limited time, to enable it to develop improvements already in sight, it can develop a magnificent industry without continued bounty or duty on sugar.—Louisiana Planter.

[LE JOURNAL DES DEBATS ; PUBLIC OPINION.]

The Brain.

The nervous system is inclosed in a bony case composed of the bones of the head and the vertebræ; the encephalos is contained in the cranial cavity, the spinal marrow in the spinal canal. The marrow and the brain do not completely fill these cavities, and the interstices are filled with a liquid, which prevents shocks and compressions. From the marrow and the brain the sensitive and motor nerves start, which carry sensations to the two central organs and take back the movements. A sensation brought to the brain by a sensitive nerve generally provokes a motion, a contraction. In such cases the brain is a center, in which the impression is transformed into action. But very often the impression is not followed by any action; the nervous system then becomes a central storehouse for impressions. M. Brissaud very aptly compares the brain to a photographic plate which retains the image and only yields it under the influence of a developing body. The brain, particularly in infancy, stores up numerous sensations, which later cause actions. The cerebral center retains these images, that is, these lasting remembrances of outward excitements. The gray substance which forms the outside covering of the brain is a sensitive plate on which images of the outer world are impressed. The nerves conduct the electric, heat, light, and sound waves to this cerebral covering, where they are impressed as on the cylinder of a phonograph. The impression is more or less exact, according to the nature of the cerebral instrument; it is more or less profound, according to the breadth or the number of vibrations of the waves. The impression thus formed becomes a recollection; it tends to become effaced with age; it submits to alterations, according to modifications of the impressed surface. These images may remain unused in the brain for a long time, as the photographic plates in their box. The idea of an object is thus always the recollection of an object.

The association of ideas often causes an association of movements, called automatic. A little girl, for instance, learns to knit. At first she is very awkward, but gradually she progresses and the work almost does itself, until finally she walks, talks, and learns her lessons while knitting. The different automatic centers occupy localized regions in the brain. The most celebrated is the center of language, localized about 1825 by Bouillaud in the front lobe of the brain. When any injury whatever—rupture of a blood vessel, softening of the brain tissue, etc.—attacks this lobe, the faculty of language disappears and the patient is stricken with aphasia. There are several aspects of this disease. Sometimes the patient cannot speak, but is able to express his thought in writing: this is aphasia of articulation; others are able to speak, but cannot even write their own names: this is graphic aphasia; others, though not at all deaf, have no idea that the name they hear pronounced is their own name, although they may be able to speak it, read it, or write it: this is auditive aphasia; others, finally, without being blind, have lost the faculty of reading, although they can still write: this is visual aphasia. Right-handed aphasics, unable to speak, have suffered some injury of the third left frontal circumvolution, and left-handed ones of the corresponding right one. Those who cannot write have some injury to the second frontal circumvolution. Those who have lost the faculty of hearing have a wound in the first left frontal circumvolution, and those who cannot see writing one of the second parietál left circumvolution. Charcot has said, and M. Brissaud repeats: "In studying cerebral affections the nature of the injury is almost a matter of indifference; the localization is everything." One may become aphasic in consequence of an attack of apoplexy, a blow or shock which causes an abscess of the brain, or a cancer which presses on that organ. It can even be produced by tuberculosis. Alas! that the brain should be so delicate an organ.



MANHATTAN LIFE BUILDING—CONSTRUCTION OF THE DOME AND CUPOLA.

Sprained Ankles.

From time to time one hears of different means of caring for sprained ankles, turned ankles, twisted wrists, etc., but the way now in vogue, says the Eclectic Medical Journal, seems to give better results than any in the past.

It is generally within an hour after the accident that you are called in to see the case. The patient is suffering very severely, and wanting very much to know if "anything is broken." After examining for fracture, order the part to be bathed in extremely hot water, every hour or two, for a period of fifteen minutes at a time. Have the water just as hot as the patient can bear it, and apply with a sponge or cloth, rather than allow the ankle to lie in the water. Then dry and let the part rest quietly, wrapped in flannels, when an application of hamamelis or veratrum and hamamelis may be made.

Before retiring apply a flannel bandage tightly around the swollen part, only being careful that the circulation is not cut off.

It is surprising how the hot applications relieve the pain and produce absorption, and how the bandage, by pressure, prevents swelling and inflammation.

Derelicts at Sea.

The Admiralty and Board of Trade Committee, of England, have recently published a curious report on the subject of the destruction of derelict vessels. The committee recommend the better reporting of derelict vessels, as to their character and location and the publication periodically of such report. But, on the other hand, they do not deem it necessary to destroy abandoned vessels or to hold international conferences to discuss the subject. The report further states that the danger of collision with derelicts is probably much exaggerated, and that to publish the information concerning derelicts given in the charts issued by the United States would be likely to mislead and needlessly alarm English mariners. This casts a very unjust reflection upon the value of the United States charts. If the derelicts are a menace to navigation, as the committee's report virtually admits, they certainly deserve more serious attention.

THE National Car and Locomotive Builder has reached its 25th year of publication. It is one of the most interesting, practical, and useful journals in the world.

Value of Photography in Scientific Research.

An interesting account of the services of the camera in scientific research has been prepared recently by a member of the Royal Photographic Society of Great Britain. It is generally admitted that the camera in recording scientific observations often serves to verify results with a thoroughness which no other test can. The English writer goes so far as to say that photography, in association with the telescope and spectroscope, has placed modern astronomy on an entirely new basis. The meteorologist by the aid of the camera has been able to study the form and nature of clouds, and the shape and character of the lightning flash. It has enabled zoologists to trace the real character of animal motion, and it is the only accurate means of reproducing the forms of organisms too small for the eye to see. The physicist has, therefore, been able to investigate phenomena in which changes occur too rapidly for the eye to detect. It is further claimed that whenever the observer of natural phenomena finds it necessary to make an accurate record of his observations, the camera is indispensable. Photography is also extensively employed in anthropology, geology, geography and archæology.

A New Hurricane Signal.

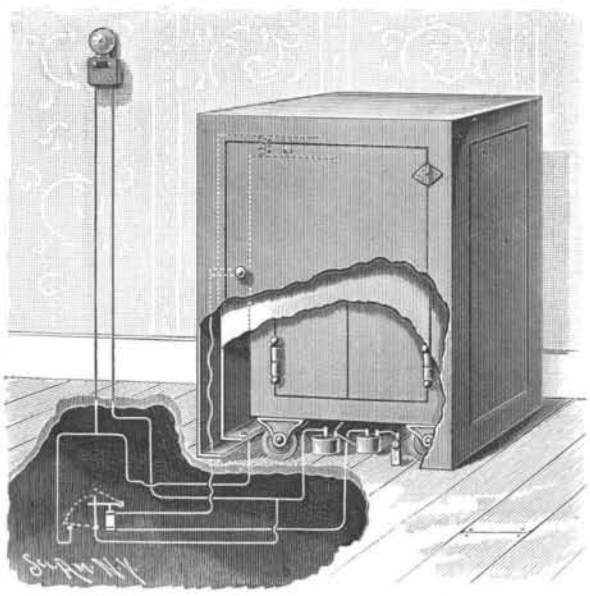
The Weather Bureau at Washington has caused the adoption of a new wind signal to be known as the "hurricane signal," to be used after January 1, 1895, as occasion demands. The signal consists of two red flags with black centers displayed one above the other. It will be used to announce the expected approach of tropical hurricanes and the dangerous storms which move not infrequently across the lakes and the North Atlantic coast. These flags will be of the same size and pattern as the one now used for the storm signal, except that the pennants will be omitted. There will be no distinctive night hurricane signal provided, but if the new signal be displayed during the day and is not changed before dark, the usual night storm signal will be displayed in its place. The direction of the storm signal will of course depend as usual upon the message accompanying the order to use it.

A CHINESE MODE OF PUNISHMENT.

In China they employ many modes of imprisonment and of punishment, the variety and magnitude of crimes being remarkable. Of these latter, perhaps, the most vulgar and common is infanticide. In Canton alone, it is said by those who are in position to know, thousands of infants are destroyed annually by their mothers. Our engraving, which is from a photograph, shows the form of punishment of three women for committal of this crime. They are yoked together between two boards made with openings just large enough to admit the neck. This apparatus is called the canja, and is the cause of unspeakable torment to the poor wretches who are doomed to its embrace.

AN ELECTRIC BURGLAR ALARM FOR SAFES.

According to the improved provision for the protection of a safe, represented in the accompanying illustration, the safe is inclosed by a metallic envelope or casing, which does not touch the safe and is insulated from it, the envelope having a door opposite the safe door. For this invention a patent has been issued to Messrs. James W. Gilstrap, of Spurgeon, Mo., and William D. Gilstrap, of Racine, Mo. The envelope or



THE GILSTRAP BURGLAR ALARM FOR SAFES.

casing rests on springs mounted on insulating blocks on the top of the safe, and depending from the envelope are top contact blocks, which strike the safe and close an electric circuit through an alarm when the springs are compressed. There is also an outer envelope which does not touch the inner one, but is in electrical circuit with the safe, this envelope resting on the floor, and also having a door opposite the safe door. A spring near this door acts as a circuit breaker when the door is opened, and in case either envelope is raised, it strikes either the safe or the other envelope, closing the circuit and sounding an alarm, a battery beneath the safe or other convenient place being connected by one pole with the safe and the outer envelope while its other pole connects with the bell. A closed circuit battery is also connected with contact lugs in the floor, which connect with the outer envelope, a wire leading from the other pole of the battery to a circuit closer composed of an electro-magnet and a hinged armature, normally resting on the magnet, but raised by a spring when the circuit is broken. When the circuit through this battery is broken, the drop falls, as indicated in dotted lines, and strikes upon the free ends of wires forming branches of the open circuit wires, thus closing a circuit through the bell and sounding an alarm.

The Arboretum.

Loudon, I believe, coined the word arboretum, about 1833 or 1834, but classified collections of trees and shrubs had been formed after the systems of Jussieu and De Candolle ten years or more before that date. Probably the collection of the Royal Horticultural Society, at Chiswick, near London, attracted the greatest attention because of the accessions of rare and new species.

No arboretum that I have visited, or seen described, has been eminent for beauty of grouping, or for giving more than a fragmentary idea of the vegetable kingdom.

The systems of botany have been partly responsible for this, but the imitative faculty of the designers even more so, and the result has been in many cases a really tiresome lineal repetition of closely allied forms.

To-day, however, the aboretum may be made beautiful, for not only has the botanical classification been very greatly improved, but we are advanced so far along the speculative and experimental stages that the best and most suitable typical forms may be selected for the harmonious grouping of the varied cohorts of vegetable life adapted to a given climate.

It has been stated recently in the Tribune that "5,000 kinds of trees" would be included in the arboretum forming in North Carolina. This is undoubtedly an error, but if it were possible, it would be very unadvisable to multiply mere varieties to that extent.

The whole flora of New Jersey contains less than 2,000 species (exclusive of mosses, fungi, etc.), and it cannot be anticipated that any hardy collection of plants in a given spot in this country will exceed about 4,000 species and distinct varieties. These, if purchased in single plants, would average less than fifty cents each.

School gardens giving a good illustration of all the hardy orders could get along with about 1,500 plants, and for purposes of comprehension, such collections would be better than the larger ones, which are impossible to be retained in the mind.

Trenton, N. J. JAMES MACPHERSON.

Eating Ice.

The following thermodynamical problem is stated and solved by the Engineer: "A boy eats two ounces of ice. Let us see what is the approximately thermodynamic equivalent of the work he has made his interior do, assuming he takes five minutes to eat it. In melting the ice he will require eighteen units to reduce it to water. To raise it in temperature to that of his inside he will require seven more units, or a total of twenty-five British thermal units. Taking the mechanical equivalent as 777 foot pounds, this will be equal to 19,425 foot pounds. If the boy weighs 100 pounds, he will have called upon his stomach to do as much heat work as would, with a machine having unit efficiency, raise him 194 feet high, or a rate of heat extraction equal to nearly an eighth of a horse power."

A CHINESE MODE OF PUNISHMENT.