The Mosque in the Champ de Mars, Paris.

On the preceding page is a large engraving of one of the many structures erected in the grounds of the Exposition, representing the peculiarities of architecture of the different nations. This feature of the exhibition is not the least interesting of the grand display. The engraving herewith presented is one of a number we have procured from Paris, representing scenes in the Exhibition, which we shall publish from time to time. We give a translation of the description of the mosque from *L'Exposition Universelle Illustrée*,

The name mosque is derived from the Arab word *mesdchid* (place of prayer), through the intermediate Italian word *moschea*. The most characteristic details of these edifices are the domes that surmount them as well as the towers decorated with crescents at their tops, known as minarets, and from whose hights a crier, the *muezzin*, calls the "faithful" to prayer. The mosques are generally of square form, in front of them there is ordinarily a courtyard furnished with all that is necessary for ablution—which forms such an important part of the worship of Islam. The interior is simply ornamented with arabesques entwined with verses from the Koran. The most rigid Mussulmen utterly proscribe the representation of any object, animate or inanimate, and their priests instruct them that at the last judgment the figures delineated by designers, artists, or sculptors will come and demand of their authors to give them a soul under penalty of perdition. The ground floor of the mosque is covered with carpet and mats; as in Spanish countries one never finds any seats. At the southeastern part of the edifice a pulpit is raised for the priest, and the devout "faithful" should always turn their eyes in the direction of Mecca—which is indicated by a kind of niche. Mussulmen alone may enter the mosque; yet frequently in Turkey, Algiers, and the East Indies this rule is daily infringed, but of course not as often as is ventured on in the *Champ de Mars*.

Adjoining each mosque are a number of charitable establishments, such as schools, hospitals and kitchens for the poor. The expenses of worship and almsgiving are covered by the revenue from real estate that for this object is exempt from taxation.

The mosque of the *Champ de Mars* is simply an imitation on a small scale of the "Green" Mosque of Brusa. All the details of ornamentation have been copied with the most scrupulous care from those of the above named edifice. As to the proportions, they have been rigorously followed from principles adopted for the design of the monument called *Yéchil Turbé*—constructed at the same date as the Mosque of Brusa by the Sultan Mohamed I., one of the Ottoman sovereigns who, following the example of his predecessors Mourad and Bajezet, has largely contributed by his numerous pious endowments to constitute Turkish art—which is much more architectural than ornate.

In conformity with the usual custom, the plan of the Mosque of the Champ de Mars is square. The edifice is surmounted by a dome, supported by lozenge-shaped arches, thus uniting the circular portion to the square base. Preceding the principal hall is a vestibule for the purpose of receiving the shoes of the faithful—for with naked feet alone may they enter the holy place. The pavilion, situated on the right, and at an angle with the façade, contains the fountain (zibil), and in the corresponding one on the left, near the Minaret, are placed clocks to indicate the hours of prayer.

The minaret that surmounts the Mosque of the Champs de Mars gives but a feeble idea of that of the Mosque of Brusa, which towers 220 feet above the city and adjoining country.

In the interior of the principal hall you see the *mihrab*, near which they turn to worship, and the *mimber*, where the priest reads in a loud voice the verses of the Koran. The walls are covered with inscriptions, but can receive no images or other material objects.

The mosques are, in all Oriental countries, supported by the special endowments of private benevolence; consequently they are very varied in their proportions, as well as in the splendor of their ornamentation, thus following the fortunes of their founders.

Correspondence.

The Editors are not responsible for the opinions expressed by their correspondents.

Mississippi Levees--Views of an Old Planter.

MESSRS. EDITORS:—I have noticed in your issue, No. 14, an article on the subject of the Mississippi levees, by Mr. Berry, of Port Gibson. The subject is one that has been considerably agitated of late, in numerous contributions to our local papers; and the discussions were to the address of our citizens who were, by their knowledge of localities, the best judges of their merits. When they contained sound views they were heeded, and, when preposterous or absurd, they were suffered to drift into oblivion. But when a contributor undertakes to enlighten the outside world, through the columns of a distant paper, and one calculated to exercise so much influence as the SCIENTIFIC AMERICAN, it becomes important to refute the errors which he may have committed. His argument is to the address of Congress, before which the question of the construction of levees on the Mississippi will be brought up again, and who will very naturally look for information to such persons as a "thirty years'" resident on the banks of the river, and an owner of lands. I hope, therefore, you will indulge a resident and planter of more than thirty years in stating the conclusions to which he had arrived from actual observations, and to suggest the manner in which the work should be done.

1st, Regarding the outlets to be given to the river above the Balize. The principal one now existing is the Atchafalaya, below the mouth of Red River, which discharges a large volume of water. It has been on the increase for a number of years, and seems to promise in time to take all the waters of Red River. The old inhabitants say that the fords in it have disappeared. The only other one existing is Bayou Lafourche, about two hundred feet wide, by twenty-five feet deep; but the current is not rapid, and it will probably not increase in size on account of its filling up about fifty miles below. The Bayou Plaquemine was about double the size, but it has been stopped up lately, as well as the Manchac, a long time ago. The effect of the stopping up of Bayou Plaquemine was to reclaim from inundation thousands of acres of land of first quality. No doubt it was for a similar object that the Manchac was closed. The opening, if made now, would necessitate leveeing on both sides, a distance of about a hundred miles, to prevent the inundation of a large amount of land now in cultivation. Beside, the effects of such an outlet would be disastrous to some of the best interests of the State, and of New Orleans. It would destroy the fish and oysters from which the city is now supplied; it would change the watering places from salt to fresh water: it would, in a short time, cause a deposit of sand and mud, injuring or preventing the navigation of Lake Pontchartrain, which is now the means of transit of a large trade, and of the products of the forest, such as lumber, pine wood, bricks, sand, tar, rosin, etc.; and all this to economise a few feet of levee. This would be the only possible outlet of the river on the east. On the west it would be equally disastrous, by drowning out the richest portion of the State in sugar lands, and it would be impossible to levee such an outlet, because it would run through an innumerable number of lakes and bayous forming a connected network from the entrance of the Atchafalaya to the sea shore, from fifty to one hundred miles in width.

Mr. Berry takes it for granted that contracting the banks of the river would have the effect of filling up the bed, which would require the levees to be made higher every year, until they would come to the hight of 100 feet, and threaten drear destruction to all the country around. The picture that he draws is perfectly appalling. But I beg leave to differ in opinion with him. It is probable that if the outlets were closed, and the river contracted and kept within its banks by levees, that the water would rise higher; but let us see how much by adding up the amount of the outlets, including Bayou Plaquemine. Bayou Lafourche, 5,000 square feet; Plaquemine, 10,000; the Atchafalaya, 40,000, or an aggregate of 55,000. Supposing the river to average one mile in width, it would be equal to a rise of nine feet (and this is an extreme case that could never occur), can it be doubted that the acceleration in the current would wash out the bottom, and make it deeper, instead of filling it up? An example in point, of the effect of the current in washing out the bottom, is what is seen yearly in Red River. Above Alexandria the river spreads into many lakes and a network of bayous, but at this point the waters are all united into one channel, because of a range of hills here crossing the river and forming what is called a fall. The water here rises to a hight of thirty feet. The rise in the river, as well as the fall, are very sudden, occurring in the space of eight or ten days. After a fall the old bed is filled up by a deposit of coarse sand, so that there is a depth of only two feet of water after the fall; but in a few days the channel is again cut out by the action of the current to a depth of eight or ten feet. I believe this law to be universal in rivers carrying much sand, and I see no reason why it should not apply to the Mississippi. And what is nine feet for the Mississippi when compared to thirty feet for Red River? In the latter is verified the fact that the current is not rapid in the bottom; but would a rise of nine feet in the Mississippi be sufficient to prevent a current in the bottom? But if the rule be that stopping outlets would cause a rise, it must not be taken for granted that the rule will work both ways. If outlets were made additional of equal capacity, it would not cause a fall of nine feet below the actual stage, nor approaching it. I have seen large breaks in the levee of a mile, where there was a high levee, through which the water flowed in a torrent, taking probably one third of the stream; the fall above was not more than from three to five feet a few miles up, and still less below.

But there is no necessity of contracting the banks of the Mississippi. The land is nearly level, with but a slight inclination from the river. Removing the levees further from the banks would be equivalent to an outlet of the same dimensions. And this plan would have a great advantage in this, that in a few years a deposit would take place between the bank of the river and the levee, and in many places I have seen it nearly as high as the levee, thereby diminishing considerably the risk of the levee giving way by the pressure of the water, and facilitating its stoppage in case it should break by accident. I say by accident, because with proper care and diligence a levee ought never to break. The causes of breaking in general are threefold: 1st, Crawfish holes from the water line to the land side, which gradually wash away a large excavation; they should be stopped on the water side. 2d, Washing away by the current when the levee is badly made. 3d, By caving, when made too near the edge where there is deep water. The usual way in which levees are made by contractors and incompetent superintendents is to pile up the dirt with wheel barrows, and for which the pay is so much per cubic yard. Levees made in this way will slide down with their own weight as soon as they are wet; example, what happened this last year for Grand Levee off Pointe Coupee. But the right way is to pack every alternate layer of about one foot in thickness by running over it with a horse and cart or with oxen. A levee made in this way with a proper base (about three feet for every perpendicular foot), is sure to be tight, and will perfectly well resist any pressure of water and the washing of the current, without any brick wall or wooden palisades. The present system requires to be changed radically wherever there is a bend, liable to be washed away or to cave. The levees are now generally too near the water. As for year after year they have been removed further back, it happens that in many places they have come up very close to buildings and valuable improvements, which has been the consideration for not placing them far enough.

It should be observed that in all streams the line of the current is longer than one running in the middle of the stream. The current in leaving a point strikes the bend on the opposite side, a mile or so below, from the next point the next bend, and so on alternately. So that the bends are always cutting away by abrasion, and, consequently, the river tending to get more crooked. This is exemplified in the many cut-offs which take place by a bend cutting a way across a peninsula; and generally the old bed fills up by a deposit of sand.

I know many old levees standing undisturbed for fifty years, not more than three or four feet high, some distance above the city of New Orleans; and actual measurements made at a distance of time of fifty years (the last made by Mr. Ellet, U. S. Survey) show no difference in the width, depth, or hight of the river, notwithstanding all the levees that have been above in that time.

Mr. Berry admits that it is a law of all flowing streams to cut out a channel, but, "in a state of nature," before the water shed is divided by cultivation. This is very true to a certain extent, but very far from being universal. The law does not apply to streams like the Mississippi, the Missouri, and Red River, which flow in valleys of alluvion, where their beds are perpetually changing, not according to any known rule or law, but seemingly by mere caprice. Those streams bear large quantities of sand and mud in flowing through virgin countries where there is no cultivation. He refers to the levee system in Europe, "which demonstrates the fact that levees must be made higher and higher every year, until they will become several hundred feet higher than the original banks of the river!" It would be better to cite localities and examples. I have seen it stated somewhere, but I cannot vouch for the truth of it, and it is the only example that I know, that the bed of the river Po, in Italy, was raised higher than the adjoining lands by the effect of levees. The system there was probably commenced before the time of the Romans, and it happens to be a mountain stream, a perfect torrent, carrying heavy pebbles. Would it be fair to say that the same effects would occur for the Mississippi in our time?

No doubt, before the war, the planters were always in dread behind their levees. Why? Only because they were badly made. Without the war, I have no doubt they would be perfect now. But the work has become impossible by the planters, because they have been impoverished and deprived of the means of controlling labor to effect the work. A work of such magnitude, and essential to the interests of several States, is really a national work, and in justice should be made by the Government, especially when in some instances the levees were destroyed by the Government. I have worked in stopping crevasses or breaks in the levee, where I controlled the labor of six hundred men, above or in the foaming waters, day and night. It could not be done now, for love nor money. I think Mr. Berry's philosophical remedy rather an unfortunate one, *no es ben trovato*, suggesting deep cultivation, two to three feet, to absorb the excess of waters. He does not inform us where this excess of waters will go, except by evaporation; and, for my part, I think they must ultimately go to the river. He does not suppose that all the land is to be cultivated—hills, valleys, swamps, rocks, mountains, and all; from these places the water must certainly go to the river. So that the hope of relief, which he holds forth by rendering the waters of the Mississippi controllable by man, seems an illusion.

As to the question of canals for navigation, in connection with the outlets proposed, they are not wanted. There are natural ones enough, and some to spare; and the railroad is better and cheaper to make.

New Orleans, La. J. C. DELAVIGNE.

Beam Engines Sticking on their Centers.

MESSRS. EDITORS:—In your issue of October 5th, I noticed a quotation from "Engineering," criticising "American Beam" or single cylinder marine engines, with reference to their liability to being caught on their centers; also editorial remarks, closing as follows: "The invention alluded to is intended only for infrequent contingencies."

Being acquainted with the performance of the engines of the Pacific Mail Steamship Company—the finest of this class—as also with the object of the invention alluded to, a few words of explanation may not be out of place.

While the valves of these engines are worked by the eccentrics, or, in technical terms, "hooked on," no assistance is ever required is passing the centers; this is shown by the steamers' logs. But while moving in port, or working at the dock, with the eccentrics unhooked, and the valves worked by hand—so as to stop or reverse on the instant—they are liable to be caught. This danger increases with the size of the engine, or lack of skill on the part of the engineer working the valves. Occasionally there are causes over which the engineer has no control, as in working our ferry boats through ice which obstructs the wheel floats, stopping the engine at the point of least power.

While this invention of Messrs. Vanderbilt & Sims is at hand in any case of emergency, it is more especially designed for use in port, and to push the engine off the center after it has been placed there for adjustment, that being the only point at which the engine can be properly adjusted and "keyed up."

The use of these hydraulic jacks will prevent such serious accidents as caused a man to have both legs broken on the steamer *Rising Star*, in the latter part of the summer; and another, more recently, to lose his life on the steamboat *Providence*. Both these accidents occurred while in port by prying the engines off the centers with levers in the wheel, as has been the usual custom.

Fear that the term "infrequent contingencies" might cause the owners of our steamers to neglect the safety of their employés, is my apology for having so far tresspassed upon your valuable space. Respectfully yours,

New York city. J. W. COLE.

The Water Ram in Pump Pipes.

MESSRS. EDITORS :—It is a well known fact that all pumps that have long suction pipe and from twenty-five to thirty feet to raise the water below the pump, make a snap or jar at each revolution of the pump, and in time wear out or break off the flange of the pipe. But the remedy is not always known, although you may have published it and I not have seen it. The remedy is this: Take an awl or some instrument with which you can punch or drill a small hole in the pipe; go down near the surface of the water you wish to raise, and make a small hole in the pipe; then start the pump, and the water and air will mix and rise in the pipe to the pump together, and of course the water and air mixed, being lighter than the water, will take all the jar out of the pump and pipe. But the pump will not throw so much water. In most cases, however, for supplying water for steam purposes, the pump throws a surplus of water. Also where a pump does not make near a perfect vacuum, by letting in the air it will bring the water. This I have tried where the pump raised the water within five feet of the pump, and it would not come any further till I made a small hole in the pipe near the surface of the water; then the pump threw it in form of foam in sufficient quantity to supply the boiler. How much air to let in I cannot say, nor how far it will hold good, but make at first a very small hole, and keep increasing it till you get the snap out of your pipe and still have water enough. I have been using the above for twenty years, and now use it at my mill when the water is low in the river. JAMES BELL.

Ullin, Ill.

[Your method of preventing the "snap" or water hammer in your pump pipes is rather primitive—not within forty years of the present hydraulic engineering. The proper way to make any pump work is to put on the supply pipe a vacuum chamber of a capacity of double or more that of your chamber. This will not only stop the water hammering but save power, inasmuch as the momentum of the ascending column will be utilized by being stored for the next stroke instead of expending its force in the destruction of the pipes. [EDS.

The Colors of Soap Bubbles.

MESSRS. EDITORS :—Reading in your valuable paper I noticed an extract from Sir David Brewster regarding the colors of the soap bubble. His theory regarding the mode in which these colors are formed recalled some experiments made by me last fall and substantiate the conclusions then arrived at. The old theory, and the one now taught is, that the colors are formed by the varying thickness of film or body of the bubble. Brewster's theory is, that the colors are formed by the flowing of secretions formed from the bubble itself over the film.

My experiments demonstrate to all appearance this theory. A preparation of oleate of soda carefully prepared was put into solution in pure water and a given percentage of pure glycerin added. Bubbles blown from this solution were very brilliant, and the colors seemed to flow over the film from the part attached to the pipe toward the lower part of the globe in irregular belts and streamers, beginning with the most brilliant hues, and tints, and shadows and gradually fading away as the menstrum ceased flowing, into a deep blue and ending with the bursting of the bubble. The belts or streamers rippled like tiny waves on the surface of a pond and from these ripples seemed to flash out the broken rays of light, changing constantly. The thicker the medium the more brilliant the display.

My attention was called at the time to this fact, but as my experiments were concluded for other ends, I forgot the facts and they were only recalled by the article referred to. I remember remarking at the time that the colors followed the flow of the menstrum from which the bubbles were made from the pipe down to the lower point, where it gathered in small drops and fell off. ALFRED C. POPE.

Binghamton, N. Y.

Gravity, Inertia and Momentum.

MESSRS. EDITORS :—The following ideas of a conflicting nature have suggested themselves. Will you be so good as to throw some light upon the difficulties proposed? It is known that within the surface of the earth the force of gravity varies directly as the distance from the center, hence at the center there is no weight. Let us take the formula,—"Momentum=Quantity of matter into velocity," and examine it in relation to a heavy body, supposed to be let fall into a shaft passing through the earth and its center of gravity. The question, (no matter how the books have settled it), presents many interesting phases. Would the body thus let fall oscillate about the center and gradually come to rest there, or would it come to rest immediately on arriving at the center of gravity?

Putting our formula into a mathematical form we have $M = Wt. \times V$. It is evident that weight at the center of the earth is equal to zero, that is $Wt. = 0$, hence

$M = 0 \times V \therefore M = 0 \therefore 0 = 0 \times V$, and hence $V = 0 \div 0$, which is the symbol of indetermination. It is not clear, therefore, whether $V = 0$, or whether it is equal to some finite quantity.

At the center of the earth, since a body is without weight, how can it have momentum? or how can it have inertia, since the inertia of a body is in proportion to its weight? What reason can be assigned, therefore, for the cessation of motion, if the body have lost its weight, and with its weight consequently its inertia? Or, on the other hand, what reason can be given for the continuance of motion, since it is clearly without both momentum and inertia?

The same logic will apply to a cannon ball shot down into such a shaft. That is its weight becoming zero, its momentum also must become zero, and its inertia gone too, what tendency could there be either to go on, or to stop on arriving at the earth's center?

If the motion should cease at this point what becomes of the initial force given to the ball? If it should continue to go on then it must have weight, momemtum and inertia at the moment it arrives at the center of gravity, a supposition contrary to the facts of the case. A little light upon this singular question will be received with much interest by a reader of the SCIENTIFIC AMERICAN. J. A. S.

Newville, Pa.

[The fallacy of the above consists in using W (weight) in the mathematical formula. It should be M (mass). On the earth mass is measured by gravity but below the surface or far from it the relation is very different.—EDS.

Interesting Facts about the Great Pyramid.

MESSRS. EDITORS:—I noticed in a late number of the SCIENTIFIC AMERICAN a short article on the "Great Pyramid," and some of the remarkable deductions which have been made on its dimensions, ratios of parts, its structure, etc. But what was in that article is but a drop in the bucket compared with the many wonderful and startling facts brought to light and admirably set forth in a work by Prof. C. Piazzi Smyth, Astronomer Royal for Scotland, entitled "Our Inheritance in the Great Pyramid." It is an exceedingly interesting work, and contains some valuable information in regard to British weights and measures. He gives a new system of each, very similar to our present ones but modified and corrected by the standards found in the pyramid. The French unit of measure (the meter) is equal to one ten millionth of a quadrant of the earth's surface. But within the last few years the progress in the science of geology has enabled us to determine "that the earth's equator is not a circle, but a rather irregular curvilinear triangle, so that it has many different equatorial axes, and therefore also different lengths of quadrants in different longitudes."

This you see throws their unit of length in a very unsatisfactory light, making it very empirical and even more arbitrary than our own or the British present standard.

The pyramidal inch is one five hundred millionth of the earth's polar diameter, a length which is invariable, of which there is but one, and consequently no possibility for mistake. There is no possibility, apparent at the present time, of introducing the French system at the time specified by Congress when it is to go into effect, and I hope it never will. It is unhandy, and will always be a source of annoyance to the common workman.

Let us have a system based on plain and already established principles which every one can comprehend, and after we have it, know that we have got that which is correct and will stand the test for ages to come. The English language is the dominant language of the world, and let us have an English system of weights and measures. The change necessary to pass from our present system to the improved one is only to lengthen our present inch 0·00099 of itself, or an amount almost inappreciable except in the nicer and most accurate kinds of mathematical instrument making.

I would advise you to procure the book I speak of and give it a careful reading, and I feel quite certain that you will think much better of the systems proposed there than the much overestimated "French system." I will gladly condense the principal deductions and conclusions arrived at by Prof. Smyth, to be published in the SCIENTIFIC AMERICAN, if you wish it, and let my work go for what it may be worth toward procuring for the noble and honorable working classes of mechanics, farmers, merchants, etc., a simple, reliable, and convenient system of weights and measures. C. B. COLE.

Chester, Ill.

[Probably our correspondent could select and arrange some of the facts to which he refers, so that they would be of interest to our readers.—[EDS.

Lightning Conductors—Their Proper Form.

MESSRS. EDITORS :—Your correspondent "Electron," in No. 15, page 227, current volume, is mistaken when he says that the conducting power of a lightning rod is as the area of the cross section, and the remark that he quotes from a former issue, that a strip is equal to a solid rod of the same surface, is also erroneous.

Electricity of high tension passes on the surface of conductors on account of its self-repulsive tendency, and for the same reason it will pass on the edges of a flat conductor. In the Agricultural Report of the Commissioner of Patents for 1859, there is an article by Professor Joseph Henry, that explains the whole subject. On page 483 there is an experiment illustrated showing that the discharge is by the surface and not by the whole substance; and on page 521 it is explained why a flat form is imperfect. Every departure from the form of a true cylinder is wrong in theory, and it is probably immaterial whether the rod is hollow or solid. If properly made and put up a lightning rod will as certainly carry off the electricity of a thunder storm as a rain conductor will the water. SAMUEL P. GARY.

Oshkosh, Wis.

A Singular Cave.

MESSRS. EDITORS :—I take the liberty of asking you a question; you may answer it if you deem it proper. About four kilometres from the town of Pontgibaud and twenty-two from the city of Clermont in the department of the Puy-de-Dome France, there is a grotto which has been formed by volcanic lava; it is funnel shaped, about six or seven meters wide on the top and two at the bottom and four meters deep; in the bottom there is a little spring running between the lava; in the summer that spring is frozen hard, no water, and in the winter the grotto is filled up with steam, and no ice. The colder the weather the denser the steam. Now can you tell why ice is formed in the summer and steam in the winter? M. A. D.

Wellsboro, Tioga county, Pa.

[We doubt the alleged facts. Speculation is idle till they are authenticated, and more details are given.—EDS.

Cleaning Cider Barrels.

MESSRS. EDITORS :—I see among the questions in your paper the query "how to clean cider barrels." Take lime water and a trace chain and put them in the barrel through the bung hole, first securing a strong twine to the chain to draw it out with. Then shake the barrel about until the chain wears or scours off all mold or pummace remaining in the barrel. Then rinse well with water; after throwing out the rinsing water put in a little whiskey, turning the barrel to bring it in contact with every part and pour out all you can. Your barrel will be sweet. J. McD.

Mamaroneck, N. Y.

Mount Hood.

The hight of this peak of the Rocky Mountain chain has never yet been satisfactorily determined, the latest measurements not being considered sufficiently reliable to settle the controversy which during the last year has been carried on by the California and Oregon papers, with considerable animation. In 1842, Lieutenant, now Rear-Admiral Wilkes, measured the mountain, and called it about 23,000 feet high. Fremont, the next year, made it between 19,000 and 20,000 feet. Those calculations were made by triangulation, and were necessarily imperfect and not much relied upon for strict accuracy. In August of last year Professor Wood, of California, ascended the mountain and reported its hight to be 17,600 feet. This was regarded as the most reliable measurement so far had, and still left it the highest mountain in the United States. As Oregon has the westernmost point of land (Cape Blanco) in the Union, they were also inclined to plume themselves on having the highest mountain peak. But California with its Shasta of 15,000 feet objected to this, and their Professor Whitney dec'ared Mount Hood to be only 12,000 feet. Thus the matter stood till this September, when Lieutenant Williamson, of the Topographical Engineers, United States Army, ascended the mountain, better prepared to measure it, as is supposed, than any of his predecessors. He has not published any report, nor pretended to give the precise hight, but places it about 11,000 feet. In all this scientific conflict the unscientific public are left in as much doubt as ever, and inclined to think that they know as much about the hight of Mount Hood as formerly.

In this connection we copy from an exchange the following graphic account of an ascent of this peak which was made by one of its correspondents:

"Monday morning, at ten minutes after six, we left our camp, armed with pikes, hooks, ropes, and such other things as we thought would lessen the danger and facilitate our journey to the top of the mountain. We carried with us a thermometer cup, spirit lamp, and glass. A ride of an hour, and we stood at the foot an immense snow field that sweeps around the south and west sides of the mountain, extending to the summit. Here we left our horses, and, after lashing ourselves together with a rope fifty feet in length, commenced our march directly toward the summit. As we proceeded, loose crags of rock kept dashing past us and plowing their way through the snow and ice toward the base of the mountain. A toilsome journey of an hour, and we stood on the edge of the crater, from which constantly rises steam and sulphurous vapor, at times making the air difficult to breathe. Here commences the peril of the ascent. We made our way toward the northeast on a narrow ridge of snow, sloping on the right to the foot of the mountain, and on the left into the crater. On this ridge we traveled until we reached a chasm about 600 feet from the summit, varying in width from 5 to 50 feet, and of an unknown depth. Along this we proceeded to the east under a perpendicular wall of ice and snow, in search of a place to cross the chasm, which we found where a snow slide had made a bridge, upon which we crossed.

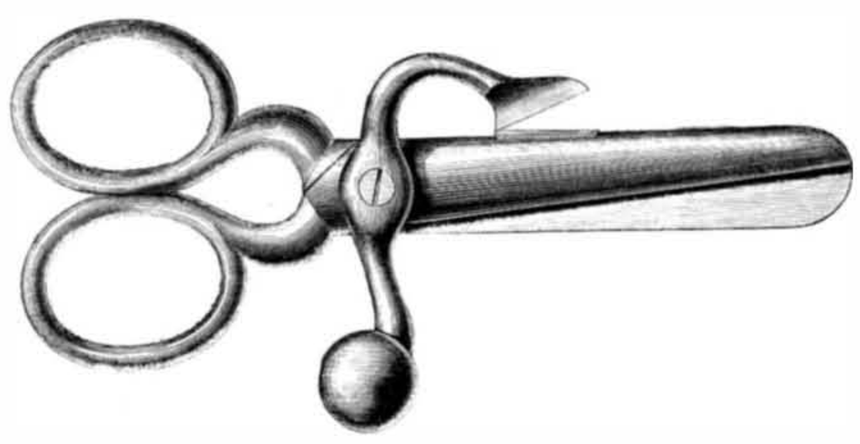
"The ascent from this point was difficult and dangerous. Instead of snow, we here found ice, making our steps uncertain. The lightness of the air and the burning rays of the sun made it difficult to proceed more than a few feet without rest. Inspired by hope and a determination to succeed, steps were multiplied and hight after hight gained, until ten minutes after eleven o'clock, and five hours after leaving camp, we stood on the summit.

"An attempt to describe the scene is useless. Those who would have an idea of the grandeur and feel the thrill of joy and wonder inspired by the map of nature opened before them, must contemplate the scene from that etherial region. From the mountains in the east the waters of the Columbia come coursing, apparently at our feet, and flow on until lost in the waves of the Pacific. Far off the Coast Range seemed to rise against the sky. On the north Mounts Rainier, St. Helen and Adams stand like massy columns. On the south, and far beyond Mounts Jefferson the Three Sisters and Diamond Peak, the dense forests fade from sight or seem to blend with the firmament beyond. Within a few feet of the summit, on a large rock, we found some papers deposited, and among them two copies of the *Pacific Christian Advocate*, dated July 21, 1866, and others dated August 2, 1867. These with some buttons and small pieces of coin, were the only articles found. The papers were well preserved, having no appearance of being damp since deposited.

"A cold wind blew from the east and was disagreeable, the mercury standing almost at zero. Water boiled at 180°, making the hight of the mountain 17,600 feet, at a point 30 feet below the summit. Having completed our observations we began the descent, after being on the mountain one hour and fifteen minutes, and reached camp in two hours, thankful that we had been permitted to stand on those isolated cliffs and view a portion of the works of Him 'who doeth all things well.'"

Improvement in Scissors Combined with Button-hole Cutter.

The engraving gives a perspective view of a pair of ordinary scissors with a blade for cutting buttonholes. The same rivet connects the two blades of the scissors proper and the buttonhole cutter, the edge of which passes by a piece inserted in one of the blades or impinges on the edge of a portion of the back of the blade prepared for the purpose. This device is actuated by the finger of the operator, the end of the cutting lever being formed into a ball, as in the engraving, which by its weight brings the blade back after being used, or into a ring to be controlled by the finger. While this attachment does not interfere with the ordinary use of the scissors, yet the implement can be readily used to cut the buttonholes in any description of fabric. Its representation is so perfect that no difficulty will be experienced in understanding its construction or operation. It appears to be well adapted to the purposes for which it is intended.



ALTHOUSE'S COMBINED SCISSORS AND BUTTONHOLE CUTTER.

A patent for this was obtained through the Scientific American Patent Agency, Oct. 8, 1867, by J. A. Althouse, of New Harmony, Ind., who will reply to all inquiries relative to the invention.

Science Familiarly Illustrated.

Salts and other Foreign Matter in Water.

Owing to its extensive solvent powers, water is never met with naturally in a state of purity. Rain water, collected after a long continuance of wet weather, approaches nearest to it, but even that always contains atmospheric air, and the gases floating in the air, to the extent of about 2½ cubic inches of air in 100 of water.

Spring water, although it may be perfectly transparent, always contains more or less of saline matter dissolved in it; the nature of these salts will of course vary with the character of the soil through which the water percolates. The most usual saline impurities are carbonate of calcium, common salt, sulphate of calcium, and sulphate and carbonate of magnesium. The waters of the New Red Sandstone are impregnated to a greater or less extent with sulphate of calcium. Most spring waters are charged with a notable proportion of carbonic acid, which dissolves a considerable amount of carbonate of calcium; the calcareous springs in the chalk districts around London contain from 18 to 20 grains of chalk per gallon, 6 or 8 grains of which become separated by exposure of the water to the atmosphere, so that a running stream will seldom contain more than 12 or 14 grains of chalk per gallon in solution. Waters which have filtered through a bed of chalk also often contain carbonate of sodium in considerable quantity, as is the case with the deep-well waters of London.

Mineral waters are impregnated with a large proportion of any one of the above named salts, or with some substance not so commonly met with; such waters are usually reputed to possess medicinal qualities, which vary with the nature of the salt in solution. Many of these springs are of a temperature considerably higher than that of the surface of the earth where they make their appearance. At Carlsbad and Aix-la-Chapelle this temperature varies from 160° to 190°. Such hot springs either occur in the vicinity of volcanoes, in which case they generally abound in carbonic acid, as well as in common salt and other salts of sodium; or they spring from great depths in the rocks of the earliest geological periods, and contain chlorides of calcium and magnesium, and almost always traces of sulphureted hydrogen. (Berzelius.)

Many mineral waters contain salts of iron in solution, which impart to them an inky taste; they are then frequently termed chalybeate waters; some of the Cheltenham springs are of this kind. In other instances carbonic acid is very abundant, giving the brisk effervescent character noticed in Seltzer water. Less frequently, as in the Harrowgate water, sulphureted hydrogen is the predominating ingredient, giving the nauseous taste and smell to such sulphureous waters. In other instances the springs are merely saline, and contain purgative salts, like the springs at Epsom, which abound in sulphate of magnesium, and at Cheltenham, where common salt and sulphate of sodium are the predominant constituents. Many of these saline springs also contain small quantities of iodine and bromine, which add greatly to their therapeutic activity.

River water is less fitted for drinking than ordinary spring water, although it often contains a smaller amount of salts; for it usually holds in solution a much larger proportion of organic matter of vegetable origin, derived from the extensive surface of country which has been drained by the stream. If the sewerage of large towns, situated on the banks, be allowed to pass into the stream, it is of course less fit for domestic use. Running water is, however, endowed with a self-purifying power of the highest importance; the continual exposure of fresh surfaces to the action of the atmosphere promotes the oxidation of the organic matter, and if the stream be unpolluted by the influx of the sewerage of a large town, this process is fully adequate to preserve it in a wholesome state. River water almost always requires filtration through sand before it is fit for domestic use; and if water works designed to supply such water be properly constructed, provision is made for this filtration. Suspended matters, such as weeds, fish spawn, leaves, and finely divided silt or mud, are thus removed; but vegetable coloring matter in solution, salts, and other bodies, when once they are dissolved cannot be arrested by such a filter.

In the gradual percolation of water through the porous strata of the earth, many even of these soluble impurities are removed, particularly those of organic origin, partly by adhesion to the surface of the filtering material, but chiefly by a slow oxidation in the pores of the soil.

The magnetic oxide of iron, indeed, seems to exert a peculiar influence in promoting the oxidation of organic matter contained in water which is allowed to percolate through it, and it appears to be probable that this action, to which Mr. Spencer has particularly called attention, may furnish a valuable auxiliary to the methods of filtration at present in use. Filtration through beds of iron turnings has likewise been practiced in some cases with advantages of a similar description, but the oxygen is in this case in great measure absorbed from the water by the iron.

The presence of organic matter in water is easily ascertained by the reducing influence which it exerts upon chloride of silver or of gold, or upon permanganate of potassium, when boiled with them. The chloride of silver becomes purplish; and chloride of gold imparts a brown tint to the water under such circumstances, owing to the precipitation of metallic gold. A very dilute solution of permanganate of potassium is rendered colorless, whilst a brown precipitate of hydrated peroxide of manganese is formed.

Water is familiarly spoken of as hard or soft, according to its action on soap. Those waters which contain compounds of calcium or magnesium occasion a curdling of the soap, as these bodies produce with the fatty acid contained in the soap a substance not soluble in water. Soft waters do not contain these salts, and dissolve the soap without difficulty. Many hard waters become softer by boiling; in such cases the carbonic acid is expelled, and the carbonate and part of the sulphate of calcium which were held in solution are deposited, and cause a fur or incrustation upon the side of the boiler.

Sea water is largely impregnated with common salt, and with chloride of magnesium, to which it owes its saline bitter taste. It might be supposed that the quantity of salts which it contains is continually on the increase, as the sea is the receptacle for all the fixed contents of the rivers discharged into the ocean, since pure water alone evaporates from its surface; but here also there is a return to the surface of the soil provided for in the marine plants, the fish, and their representative guano, which are perpetually being raised from its depths by the force of storms, by predatory birds, and by the industry of man. The specific gravity of sea water is subject to trifling variations, according to the part of the globe from which it is taken. The waters of the Baltic and of the Black Sea are less salt than the average, while those of the Mediterranean are more so. The waters of the Mediterranean in the Levant are more salt than those of the same sea near the Straits of Gibraltar. The mean specific gravity of sea water is 1·027, and the quantity of salts ranges from 3·5 to 4 per cent.

Tyrian Purple.

The Tyrians were probably the only people of antiquity who made dyeing their chief occupation, and the staple of their commerce. The opulence of Tyre seems to have proceeded, in a great measure, from the sale of its rich and durable purple. It is unanimously asserted by all writers, that a Tyrian was the inventor of the purple dye, about 1.500 years before the birth of Christ, and that the King of Phœnicia was so captivated with the color, that he made purple one of his principal ornaments, and that, for many centuries after, Tyrian purple became a badge of royalty. So highly prized was this color, that in the time of Augustus, a pound of wool dyed with it, cost at Rome, a sum nearly equal to thirty pounds sterling. The Tyrian purple is now generally believed to have been derived from two different kinds of shell fish, described by Pliny under the names *purpura* and *buccinum*, and was extracted from a small vessel or sac in their throats to the amount of one drop from each animal; but an inferior substance was obtained by crushing the whole substance of the *buccinum*. At first it is a colorless liquid, but by exposure to air and light it assumes successively a citron yellow, green, azure, red, and, in the course of forty-eight hours, a brilliant purple hue. If the liquid be evaporated to dryness soon after being collected, the residue does not become tinged in this manner. These circumstances correspond with the minute description of the manner of catching the purple dye fish given in the work of an eye witness, Eudocia Macrembolitissa, daughter of the Emperor Constantine the Eighth, who lived in the eleventh century. The color is remarkable for its durability. Plutarch observes, in his life of Alexander, that, at the taking of Susa, the Greeks found, in the Royal treasury of Darius, a quantity of purple cloth, of the value of five thousand talents, which still retained its beauty, though it had lain there one hundred and ninety years. This color resists the action even of alkalies, and most acids.

Pliny states that the Tyrians gave the first ground of their purple dye by the unprepared liquor of the *purpura*, and then improved or hightened it by the liquor of the *buccinum*. In this manner they prepared their double-dyed purple—*purpura dibapha*—which was so called, either because it was immersed in two different liquors, or because it was first dyed in the wool and then in the yarn.—*Prof. Dussauce.*

ALUMINUM—ITS PROPERTIES AND USES.

The discovery of this metal dates back only to 1827, when Wöhler, a German chemist succeeded in extracting it from clay. It is a white metal, not like silver, but having a bluish tinge, Its specific gravity is from 2·5 to 2·67 according to its purity. It is considerably lighter than flint glass, being, as seen above, only about two-and-a-half times heavier than water. Bulk for bulk it is four times as light as silver and a little more than quarter the weight of copper. It is nearly as hard as iron, but can be softened by annealing; has great rigidity and tenacity; can be turned, chased, and filed with ease, never clogging the file; and can be drawn into wire as fine as a hair and rolled or beaten into sheets whose thinness can be surpassed only by those from gold or silver.

For mustard and egg spoons it would be an excellent material, as, unlike silver, it it not affected by sulphureted hydrogen or other sulphureted compounds. It retains its luster in the ordinary atmosphere and is not affected by boiling water, diluted sulphuric, or strong nitric acid, which attacks silver, but has no action upon aluminum when cold, and it is not affected when plunged into melted niter, potass, or sulphuret of potassium, a test which even gold or platinum cannot withstand. It is dissolved, however, in muriatic acid and has a powerful attraction for chlorine.

It has been used in France and England for ornamental purposes, as finger rings, brooches, chains, etc. A cup made of it, although very thin, was not indented by falling from the hand to the pavement. These peculiar properties would seem to make it a proper material for light field guns, cuirasses, helmets and coins, but for the cost of extracting it from its earthy base of argil or clay.

When the inventive genius of man has discovered a cheap and rapid process of extracting aluminum we may expect it to assume a much more important position in the useful, as well as the ornamental arts, than it occupies at present. A beautiful compound is now manufactured in France and England composed of aluminum 10 and copper 90 parts. We have seen a paper cutter, the blade and handle made of this, which had a beautiful yellow or deep straw color, was elastic, tough, and of a very fine finish. Its color is more grateful to the eye than gold and its luster brilliant. The earth metals, of which aluminum may be considered the head, will in time become as valuable for use as they are now for ornament or for the purposes of the chemist.

Is an Illustrated Description a Good Advertisement.

This question is most emphatically answered by the experience of the agent of the Hinkley Knitting Machine, Mr. G. E. Harding, who, since the illustration of the machine appeared in the SCIENTIFIC AMERICAN—less than one week ago—has received orders for not less than 1,750 machines, which he states were obtained in consequence of that publication. Perhaps part of this success may be attributed to the undeniable excellence of the machine, but some of it is undoubtedly due to the influence of this paper.

Native Wines at the Exhibition.

Speer & Co., of Los Angelos, Cal., and 243 Broadway, New York city, exhibited at the Fair of the American Institute a fine collection of specimens of their Catawba, Port, and Sherry wines. Of undoubted purity, manufactured from California grapes, these wines were pronounced by judges fully equal, if not superior to those of authoritative genuineness which are imported under the same name.

"THERE IS NOTHING LIKE LEATHER."—The *Shoe and Leather Reporter* suggests that our government might with profit follow the example of the Walrussians in using a leathern currency, and thus find a valuable substitute for our present torn and defaced promises-to-pay.