THE CLOCK OF STRASSBURG.

The late transit of Venus curiously proved the accurate calculations of the ancient makers of that famous horological curiosity, the Strassburg clock. A few days before the transit, the *American Register* tells us, visitors to the cathedral, inspecting in the planetarium attached to the clock, noticed that one of the small gilt balls representing Venus was gradually moving toward a point between the sun and the earth, and on the day of the passage the ball stood exactly between them. Old Conrad Dasypodius, the Strassburg mathematician, superintended the manufacture of the clock and its accompanying planetarium some time between 1571-74, the dates differing according to various authorities; and it is interesting to note that, after three hundred years of existence, the clock faithfully fulfills the calculations of its dead inventor.

A correspondent sends the foregoing, which is quoted from the *London Graphic*, expresses doubts of its correctness, and asks for information. One of our astronomical correspondents sends us the following notes:

The construction of a machine which would exhibit accurately the motions, distances, and magnitudes of the planets, and could be kept in running order for three hundred years, is an impossibility. Such a piece of machinism would require the skill of the Great Architect of worlds.

The history of the Strassburg clock and the planetarium connected with it bears witness, like everything else, to the imperfection of workmanship, and the frequent necessity of changes and repairs.

The clock stands in the cathedral, and dates back to 1352, when it was put up under the patronage of Berthold de Buchek, at that time Bishop of Strassburg. As time passed on, the clock got out of order, and in 1547 three distinguished mathematicians were commissioned to put it in repair. They all died before the work was finished, and Conrad Dasypodius undertook the responsible task, which he completed in four years. The clock worked well until 1783, the year of the Great Revolution, when it struck for the last time.

It was left undisturbed for nearly fifty years, and fell into a dilapidated condition, mournful to behold. An effort was then made for its restoration. This was found to be impossible, for the works were rendered almost useless by rust and verdigris. Finally, Schwilgue, an artist and mathematician of Strassburg, undertook to repair, modify, and reinstate the clock. He commenced the task in 1836, and, after working four years, completed it in 1840.

A mythical story is told of him, which does not redound to the honor of his fellow citizens. It is said that he had engaged to construct a similar clock for the capital of one of the Swiss cantons, and that his ungrateful townsmen put out his eyes to prevent his fulfillment of the contract.

Schwilgue placed the mechanism of the old clock in the old casing, after skillful improvements and alterations, where it continues to be a source of proud satisfaction to the inhabitants of Strassburg, and an unfailing object of attraction to travelers from all quarters of the globe. Besides the remarkable performances connected with the regular clockwork, it shows the siderial time, the movements of the planetary system, and the precession of the equinoxes. It is claimed that the mechanism is so perfectly elaborated that it marks the 29th of February in every leap year.

It is not impossible that the planetarium may have marked the transit of Venus on the 6th of December last, for if the inclination of the orbits of Venus and the earth to the ecliptic is accurately represented, Venus must sometimes be at a point directly between the earth and the sun, and consequently make a transit over his disk. The possibility of such an occurrence probably never entered the mind of the ancient Conrad Dasypodius; much less had he power to make the accurate planetary arrangements to bring about a result, after a lapse of three hundred years, depending on contingencies then unknown. It was not until the seventeenth century that Kepler so far improved the planetary tables as to predict that a transit of Venus would occur on the 6th of December, 1631.

We have no means of knowing what improvements Schwilgue made in the ancient piece of mechanism, but it is safe to say that absolute perfection was not attained. If Venus did actually wheel into line between the earth and sun on the 6th of last December, we are inclined to think it must have been a simple coincidence rather than a result of profound mathematical calculation. If such were not the case, why did we hear nothing of the transit of Venus in 1874, nor of the six transits of Mercury that have taken place since the planetarium was put in order in 1840?

INSECTS AND PLANTS.

The tenth of the course of the Saturday lectures under the auspices of the Biological and Anthropological Societies of Washington was delivered by Professor C. V. Riley, his subject being "Adaptation and Interdependence between Plants and Insects."

The first part of the lecture consisted in a popular exposition of the more curious and striking facts that have of late years been ascertained in reference to the mutual adaptation between flowers and insects, and particularly to the movements, structure, digestive powers, and other peculiarities of insectivorous plants. This part of the lecture was illustrated by colored diagrams, and included some of the lecturer's own observations.

The second part of the lecture was devoted to some general conclusions which the facts naturally led to. Here the chief aim seemed to be to emphasize the principles of evolution as applicable to the development of special or peculiar structures. The attention and approval manifested by the audience were noteworthy as indicating the increasing acceptance by the intelligent masses of the more modern biological ideas.

We give some of the closing words of the lecturer, who described many of the actions of insects as rational and the movements of plants as voluntary: "It may be that plants can appreciate neither pleasure nor pain, and that all their actions are reflex and automatic, but, if so, then so are the majority of the movements, not only of the lower, but likewise of the higher animals. It may be that all the actions of insects and the lower animals are instinctive; but I prefer to believe, and feel convinced, that many of them are rational.

"Allowing all the power they deserve to radiation, light, heat, electricity, etc., and they yet fail to explain these plant motions which I have called voluntary, and which are performed independently of those influences. Darwin, in the last published work of his life, felt obliged to use the word *perceive* in reference to many of these movements, and it is difficult to conceive of irritation without sensation.

"Protoplasm is, so far as we know, the basis of both vital and psychic phenomena, and the manifestations of sensation and consciousness are of the same nature throughout the organic world. They differ only in degree, and it will ever remain, perhaps, a matter of opinion and faith as to just where volition and consciousness begin, or, to use another figure, just how much concentration or massing of the protoplasm or how much organization of structure is necessary to intensify those phenomena into consciousness. One thing is certain and profoundly significant, viz., that the lowest organism and the first existant on our planet possessed at some stage of development—whether in the embryonic, the larval, or the sexual state—the power of independent motion—activity. It matters little whether we call them animals or plants; they were, and their present representatives yet are, perhaps, combinations of both. They represented the potentiality which has developed on the one side the most complex animal intelligence, and on the other the highest vegetative organization.

"One thing at least I hope I have demonstrated, viz., that the study of nature loses nothing of interest by the developmental principle that her manifestations are due to secondary laws; that in tracing the origin of things, as they now exist, from pre-existing things the mind is but grasping at the method by which the Creator works. There must ever remain to the philosophic student of life upon our planet a sense of his nescience of the ultimate first cause—the Infinite; and the highest induction as to this infinity is perfectly consistent with the theory of evolution so irresistibly impressed upon those who study aright the great book of Nature!"

Incidents in a Philosopher's Boyhood.

Prof. Joseph Henry, one of the most eminent of American scientists, died May 13, 1878. On Thursday, the 19th day of the present month, his memory is to be honored by the unveiling at Washington of a magnificent bronze statue, made by W. M. Story, and costing $15,000.

Among the interesting reminiscences of his boyhood is the story of his first pair of boots—a true story, often told by himself in later years.

When he was a boy, it was the universal custom to have boots made to order, and his grandmother, with whom he was living, indulgently allowed him to choose the style for himself. There was no great variety of styles. Indeed, the choice was limited to the question of round toes or square toes. Day after day Joseph went to the cobbler's and talked over the matter without coming to a decision, and this even after their manufacture was begun, until at last the shoemaker, fairly out of patience, took the decision into his own hands and made a most remarkable pair of boots—one boot round toed, the other square toed.

Later in life Prof. Henry often came deliberately to his decisions, with the advantage that he seldom if ever had occasion to abandon them.

While Joseph was a schoolboy he acquired a taste for reading in this peculiar way: One day he chased a pet rabbit through an opening in the foundation wall of the village meeting-house. While crawling about among dirt and rubbish a gleam of light enticed him through the broken floor, and he found himself in a room containing the open bookcase of the town library. The title of one of the books struck his fancy and he took it down. It was Brooks' "Fool of Quality," and he read, coming again and again through the hole in the floor, until access by the door was finally granted him. From this first book that he ever read with relish, he passed on eagerly to other works of fiction in that library.

A few years later, in a way almost equally accidental, his mind was turned to an entirely different class of reading.

Confined at home by a temporary illness, he took up a book casually left on the table by a boarder, and entitled "Lectures on Experimental Philosophy, Astronomy, and Chemistry, intended chiefly for the Use of Young Persons. By G. Gregory." It began with a few questions: "You throw a stone, or shoot an arrow into the air; why does it not go forward in the line or direction that you give it? . . . Why does flame or smoke always mount upward, though no force is used to send them in that direction? And why should not the flame of a candle drop toward the floor when you reverse it or hold it downward?

Again, you look into a clear well of water and see your own face and figure, as if painted there. Why is this? You are told it is done by the reflection of light. But what is the reflection of light?"

The trifling incident of taking up this book may be said to have turned the whole course of this lad's life.

After his death this book was found in Professor Henry's library with the following entry upon the fly-leaf, written in his own hand:

"This book, although by no means a profound work, has, under Providence, exerted a remarkable influence upon my life. It accidentally fell into my hands when I was about sixteen years old, and was the first work I ever read with attention. It opened to me a new world of thought and enjoyment; invested things before almost unnoticed with the highest interest; fixed my mind on the study of nature, and caused me to resolve at the time of reading it that I would immediately commence to devote my life to the acquisition of knowledge."

Many young men quit school at sixteen years of age. They should take a lesson from Joseph Henry, and regard education as not completed, but just begun.

C. P. OSBORNE.

Fishing by Electricity.

According to a correspondent of the Philadelphia *Press*, the electrical apparatus of Professor Baird's expedition is very complete. The search light is one of the most novel of the wonderful inventions of the nineteenth century. It consists of three Edison electric lights of 16 candle power each, inclosed in a hermetically sealed glass case, which is surrounded by a glass globe, and capable of resisting the pressure of the water at a great depth. It is proposed to sink the lamp and illuminate the sea by turning on the light. This, it is expected, will attract the fish, and a net ten feet in diameter at its mouth placed below the light will be drawn at the proper time, and the unknown fish of the lower waters will be caught. "It is an improvement," said one of the officers of the ship, "on the method of the Indian who searched the rivers at night time with a burning pine knot in the bow of his canoe and a spear in his hand, but the idea is really stolen from him."

Paymaster Read has the most perfect arrangements for his work. He will be able to photograph fish and shells, as soon as they are taken out of the water, by a vertical camera. This is necessary, as in some cases the air changes the form of some of the curiosities of the sea. The sea water will also be brought to the surface from any depth desired for analyzation. During the trip of the Albatross from Wilmington an arc light has been first successfully operated on an Edison circuit, and an invention has been completed for lighting the surface of the sea, which will be useful for signaling and for the prosecution of all kinds of work at night.

An Internal Mite in Fowls.

Professor Thomas Taylor, microscopist of the Department of Agriculture, had occasion recently to dissect a sick chicken, and he found that all parts of the lungs, the bronchiæ, and the linings of the thorax and abdominal cavities were covered more or less thickly with a mite. An examination we were requested to make showed it to be in all respects identical with *Cytoleichus sarcoptoides*, Mégnin. This parasite is known in Europe to inhabit the air passages of gallinaceous birds, giving the transparent and membranous linings of these passages the appearance of gold beater's skin speckled with flour. It is likewise found in the bronchial tubes and their divisions, and even in the bones with which the air sacs communicate. Mégnin believes that while the mite may be extremely numerous, so as to cause mucous irritation and induce asphyxia and congestion by obstruction of the bronchiæ, and that birds may thus die, yet it is incapable of causing, as Gerlach and Zundel believe, enteritis or inflammation of the peritoneum.

Talking One Thousand Miles.

We recently described some extraordinary telephone experiments on the Postal Telegraph Company's line between this city and Cleveland, O., a distance of six hundred and fifty miles. This experiment was so successful that it was expected the distance could be greatly extended. The Postal Telegraph Company's wire now reaches Chicago, which is distant one thousand miles, and we are informed that telephonic communication has been carried on for some days between this city and Chicago: the transaction of business over the line by this means being an every day occurrence. The instrument used in this experiment is the Hopkins telephone, described in our former article.

MOUNT ÆTNA is in eruption, pouring out from the central crater a stream of lava. Vesuvius is in its usual passive state, although there is always a subterranean stream of lava flowing. Visitors are conducted by guides to the spot where the liquid fire may be seen through an aperture in the solid crust of lava. The column of smoke constantly ascends, and at intervals at night there is a brilliant light.

The Steam Engine.

The *Commercial Bulletin* justly concludes that it seems like a reproach upon the mechanical skill and ingenuity of the nineteenth century that nine-tenths of the caloric force applied to even the most economical steam engine is wasted. That is to say, every ton of coal is one-third wasted in the process of generating steam, and when the steam is once formed, only one-seventh of it is actually converted into work by the engine. The remaining six-sevenths is lost either in the exhaust or through radiation from the cylinders or in similar ways; so that only one-seventh of two-thirds, or about one-tenth of the whole heating power of the fuel, becomes actually embodied in the working power of the engine.

An actual test made with the pumping engine of the Lynn (Mass.) water works showed that of 4,264,125 units of heat generated by the furnace, only 2,798,660 (or 66 per cent) were converted into steam, and only 430,625 (or a trifle less than 10 per cent) contributed to the working force of the engine. A unit of heat is the amount required to raise the temperature of a pound of water one degree, and is one forty-second part of a horse power. It follows, therefore, from the above figures that of 100,000 horse power generated in the furnace of the Lynn pumping engine, 35,000 were wasted between the furnace and the boiler and 55,000 in the engine.

But even those results were only obtained on one of the most economical of engines. A common high pressure engine of the best type usually utilizes but 6 per cent of the energy generated by the fuel. In locomotive engines only 2½ per cent of the caloric power is used.

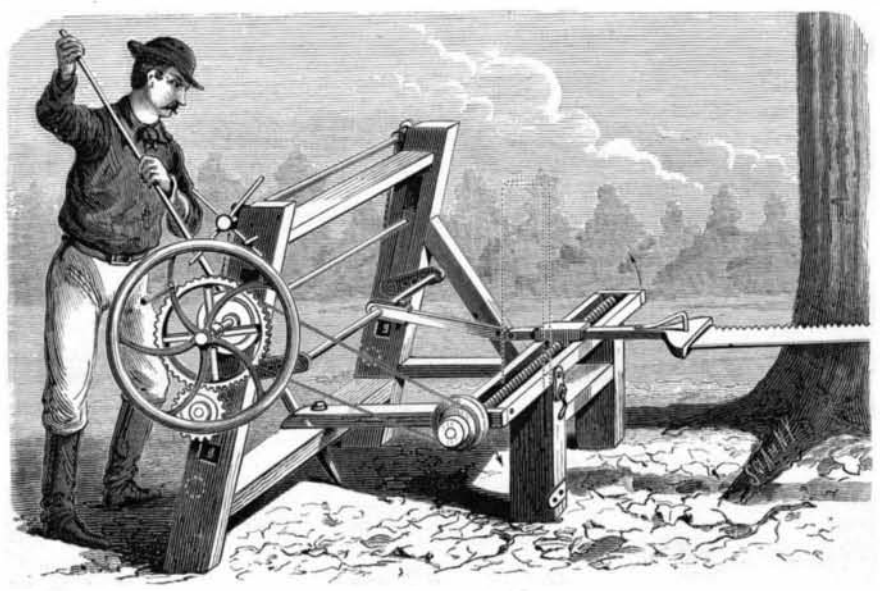
Invention is said to be the result of two things: first of the sagacity which has discerned a want; and secondly of a resolute effort to supply that want. The first of these requisites is evidently at hand in the case of the steam engine, and if "necessity is the mother of invention," the second ought not to be wanting in this age of marvelous mechanical and scientific achievements.

Economy in Hops.

The extraordinary prices which hops have fetched this season must have set many brewers thinking as to how some economy might be effected. Any process, says the *Brewers' Guardian*, by which three pounds of hops can be made to go as far as four pounds would be of enormous value. Many suggestions have been made, but we hear of none of them being practically applied. There seems to be two ways in which some economy in hops might be effected: one is to grind or tear the hops before maceration, so that their essence may be more easily and completely extracted; the other is to prevent the loss of the essential oil by extracting the hops in closed vessels. Long boiling undoubtedly dissipates much of the fragrant aroma of the hop, as the neighborhood of any brewery so frequently testifies. If the hops were submitted, prior to boiling, to a current of steam at high pressure, a large percentage of the volatile oil might be condensed and collected; this oil could be added to the wort at the termination of the boiling, and the steamed hops could be boiled with the wort as usual; our brewery engineers ought to have no difficulty in devising and constructing the necessary plant for this operation, and its cost would soon be saved in a season like the present.

IMPROVED SAWING MACHINE.

Our engraving represents an improved sawing machine recently patented by Mr. H. K. Olson, of Coalville, Utah Ter., and designed for felling trees and sawing logs into lengths. The machine can be driven by hand or power, and is capable of working either horizontally or vertically. It has an automatic screw feed for moving the saw forward when making a horizontal cut, and this feed is readily detached when it is desired to saw vertically, so as to allow the saw to feed by its own gravity. The entire apparatus is mounted on a light portable frame, so that it may be easily transported from tree to tree or log to log, as occasion may require. The crank shaft and the driving shaft are mounted in sliding boxes, movable up and down by the windlass at the top of the inclined posts. The crank is wide to admit of the lateral movement of the connecting rod, and it is adjustable as to the length of its stroke; the design of this arrangement being to adapt the machine to different kinds of work. The saw guide moves through a sleeve that is adjustable along the slotted bar by means of the screw in the slot of the bar. The screw receives its motion from the driving shaft of the machine by a belt. As the crank of the drive wheel is turned the saw is reciprocated, and at the same time moved forward to its work. When it is desired to saw vertically, the feeding screw is disconnected from the saw guide, and the slotted bar is placed in a vertical position, as shown in dotted lines in the engraving. The joint between the saw guide and the connecting rod is swiveled to admit of turning the saw at any desired angle. This machine works rapidly and easily, and may be operated by one or more men, or by horse or steam power.



OLSON'S SAWING MACHINE.

THE ordinary speed to run a pump is one hundred feet of piston per minute.

NEW LAMP EXTINGUISHER.

The extinguisher shown in our engraving is applicable to all forms of lamps, and is capable of putting out the flame instantly, without the slightest danger of exploding the lamp. It is well known that to extinguish a lamp by blowing down the chimney is a dangerous operation, especially where the lighter grades of oil are used. It is troublesome to remove the chimney whenever it is desired to put out the lamp, and blowing from beneath does not usually accomplish the object.

The ingenious invention shown in the engraving obviates all these difficulties, and adds but a mere trifle to the cost of the lamp. Two extinguishing plates, hinged under the cap

GREENHALGH'S LAMP EXTINGUISHER.

and near the wick tube, are provided with arms, which project outward and through oblique slots in a plate connected with a wire that extends downward along the side of the lamp and its standard, and is provided with a knob or handle, by which it may be readily pulled down, so as to effect the closing of the extinguishers over the end of the wick tube. A spring surrounding the wire returns the parts to their normal condition.

This useful invention has been patented by Mr. John B. Greenhalgh, of Blackstone, Mass.

The London Fish Exhibition.

The largest and most complete fish show ever held will be opened by Queen Victoria at the South Kensington Gardens, London, during May, which in importance and extent, it is expected, will eclipse the great German Exhibition of 1879. All branches connected with fish or fishing in their practical, commercial, scientific, and historic ways will be represented. One class of exhibits will include sea fishing gear of all kinds. Fresh water fishing will be represented by rods, reels, artificial flies, etc. Another class will show all kinds of articles used and worn by fishermen, even to the clothing. Fish in all forms, canned and uncanned, as prepared for commerce will occupy a large space, and will constitute one of the most important features of the show.

From former shows of this kind held in Europe great benefit has been reaped by this country. Above all, a vast increase of export trade for American fish products has sprung up from these exhibitions. To Australia alone are now sent ten times as many of these products as in 1870—last year's shipments amounting to two million dollars.

The fishing interests of the United States greatly exceed those of any other country, and it is expected that the exhibits shown by us will surpass all others in the completeness and variety of articles shown. For the collective exhibit at Berlin the United States obtained the first prize and the greatest fame; and the collection made up for London is more perfect, especially in angler's material, than the one sent to Berlin.

Prof. Baird has loaned and sent over from the Smithsonian Institution a very large and important collection of fresh, stuffed, and preserved fish, and many plaster casts of odd and curious occupants of the sea. The spacious structure in which the exhibition is to be held is located in the beautiful gardens of South Kensington.

A visitor, in passing through the main entrance, will find himself opposite a spacious lobby, the walls of which are marked at the sides "Great Britain," and so apprising him that the space is to be devoted to articles connected with the British fisheries. To the left, just immediately on entering, are spacious dining rooms with large kitchens in the rear, while to the right and left, running from the central walk which goes due north, stretch east and west on each side respectively, the halls for life boats, of which there will be a grand display, a prize of $3,000 being offered for the best and safest; and the machinery in motion, such as for fish curing and tackle making. Beyond these ranges, and immediately on entering upon the foreign and colonial branches, a site is being prepared for the Prince of Wales' pavilion.

Passing the royal pavilion, will be found arranged, running east and west, exhibits from Newfoundland and the Netherlands, the former, no doubt, being mostly representative of cod fishing on the world-famed banks. The sections for America, Canada, Newfoundland, Norway, Sweden, the Netherlands, and Belgium apply for an average of 10,000 square feet each; China, Japan, India, and New South Wales requiring together about 30,000 square feet.

The United States exhibit will be found to the left, alongside of that for Canada, while running north and south, parallel and alongside, will be the collections of Sweden and Norway; Spain and New South Wales occupy, together with China, corridors in the right wing; the Chinese exhibits will be arranged in the form of a pagoda. Great Britain, again, runs right round the outside of the exhibition, through the conservatory on the north down to where the aquarium will be situated. Close to the aquarium will be found the exhibits of Belgium and Russia, which will also be well represented. A fish market at the right entrance will be an interesting feature, and the fish dinners in the dining rooms will, no doubt, be indulged in by many; simply with a view to learn how many different ways a fish may be cooked after it has been hooked.

The Berlin exhibition was visited by 483,000 people, while this one in London, a city of 5,000,000 inhabitants, will unquestionably be visited by several millions.

The American commission who go out in charge of the United States exhibit are Prof. G. Brown Goode, Deputy U. S. Fish Commissioner; Mr. R. E. Earl, in charge of fish culture; Capt. J. W. Collins, in charge of nets, boats, and marine fisheries; Mr. Joseph Palmer, taxidermist; Mr. Reuben Wood, in care of the angling exhibit; a secretary, and perhaps others.

The Cost of Stopping a Train.

This is a problem which may possibly be cleared up one of these days, but just now the outlook in that direction is not promising. The best plan would seem to be, to get a large number of experienced railroad men to guess at it and then average the guesses. This would be an approximation near enough, perhaps, for all practical purposes.

Any one who will figure the cost of stopping a pasenger train down to the fraction of a cent, and then prove his figuring to be correct, will beat the weather prophets all to pieces. A very little reflection, however, ought to satisfy any rational mind that it is quite impossible to disentangle and separate all the elements of cost that enter into the stopping of any particular train from the various elements of cost involved in the general operations of a road.

There is manifestly no dividing line by means of which the former can be eliminated with any degree of precision. The basis upon which to work in order to arrive at an approximate result is more unreliable than that upon which the mileage cost of transporting freight is estimated, and apparently of much less importance. It is a problem, as it seems to us, that is more speculative than practical. The making of stops by railroad trains is a necessity, no matter what the cost may be. The cost of the regular stops of passenger trains is probably about as little as it can be with due regard for the interests of the traffic, and if such cost could be ascertained with absolute certainty for each and every train, it would amount to little more than a curious piece of information.—*National Car Builder.*

MESSRS. EMERSON, SMITH & CO., Beaver Falls, Pa., have received notice that, with a 68-inch No. 7 gauge circular saw purchased from them, Messrs. Terry & Casey, of New Orleans, lately sawed 600 feet of 6 x 8, 8 feet long, 200 feet 1½ x 14 inches, and 260 feet of inch boards, all yellow pine, in *three* minutes, making 1,060 feet in all.