Scientific American.

NEW YORK, SEPTEMBER 26, 1857.

Poison and Adulteration.

Happily for us, the day has gone by when human life was of so little value that poisoners were to be found in all classes or ranks of society, and their deeds of villany were done in the open day without the smallest fear of detection. In the olden time, if one person wished another out of the way, all he had to do was to signify his wish to some one of the numerous learned villains, who would do it for a consideration. Chairs, clothing, food, beverages, all were capable of being poisoned, and persons knowing of no other means used to wear amulets and charms to protect them from the effects of the poisoner's art. This refined method of murder had become a study, and was practiced as an art, as we know from the notorious examples of Brinvilliers and Borgia. We say, happily these days have passed away, for the light of pure and glorious science has broken in upon us, and now, as sure as the most subtle poison is administered, either by the microscopist's minute vision or the chemist's magic test, will that same poison again be brought to light, and made to confront the poisoner face to face. As a natural consequence, direct and intentional poisoning has diminished, but indirect and unintentional poisoning has increased, and all from the want of a little more knowledge generally diffused. Take an example: not long ago in Scotland, a party sat down to dinner and ate some horse-radish, as they thought, and all died in the greatest agony, for they had eaten aconite, a most deadly poison, instead. Now these two plants are much alike, and surely we ought to learn their distinctive features, that we may know for ourselves, and not trust our lives to an ignorant cook.

There are so many substances nearly alike —the one a deadly poison, the other perfectly harmless, or perhaps beneficial—that we hope in time to see some means adopted in every city whereby all these bodies may be placed in such a manner that all their individual peculiarities shall be pointed out. Thus now-a-days, from want of knowledge comes unintentional poisoning, but from an evil application of knowledge comes indirect poisoning, and this is carried on through every branch of trade, under the name of adulteration. The London *Lancet* first directed the attention of the public to this subject, by publishing analyses of various articles of consumption bought promiscuously in small and large quantities. The examiner-in-chief was Dr. Hassall, who has since published a very valuable work on this subject, and from its pages we learn that almost every article that we eat, drink, or inhale, is more or less adulterated. Thus coffee is mixed with chicory; tea with sloe and tea leaves which have been previously used; bread with alum, potatoes, and all sorts of things; and cayenne pepper with red lead. Pickles are made green by sulphate of copper (verdigris); red lead and tumeric are common in preserved meats, tobacco and segars are made up of cabbage leaves, apple parings, and all kinds of rubbish; but what is worse than all is that many medicines are also mixed with articles perfectly contrary to them in effect, although perhaps having some resemblance in outward appearance. If a physician writes a prescription, and that, being made up by a druggist of adulterated drugs, does not act as the medical man expects, but injures the patient, is not the druggist or adulterator to be held responsible? In England this question has excited so much attention that there is an agitation on foot to appoint local inspectors of articles of commerce, who shall have the power of indicting any one who sells an impure for a pure article, and thus sending out not only an acted lie, but also great injury to the public health. We may be asked, how does this question affect *us*? We are not in England. Our storekeepers may be honest, while their's are not. There is no doubt they *may* be honest; but we must recollect that it is not mere dishonesty that induces adulteration, but that principle of trade which prevails equally on both sides of the Atlantic, namely, competition—the desire to obtain custom by underselling, and the folly of the public in patronizing the low-priced stores simply because they are low-priced.

We hope to see the people of this country arousing themselves to this inquiry, and making up their minds not to take poison in any shape or form whatever.

The Iron Age.

Poets have given to each age of this world's history a typical metal, one which has characterized and typified the leading features of civilization at the time, and which, so to speak, by its own physical properties and uses, has reflected the manners, customs and habits of the people then living. Following the idea of the poets, we call this the Iron Age; for if any period deserved such a name, it is that portion of time which we call "to-day!" Iron is our strength and stay; without it, the onward march of civilization must stop, and the word "Progress" be cancelled from our language. By a providential arrangement Iron is universal in its occurrence in nature, and by human ingenuity and talent it is universal in its application. Let us look, first, at its universal occurrence, and think how vast must be the quantity in the world. It is found in all the rocks that form the crust of our globe, in greater or less quantity, as may be seen from the prevalence of red and reddish brown in their colors; in all animals, for it is Iron that colors the blood; in all fishes, for it exists in the waters of the sea. Go where you will, and turn in any direction you may, Iron meets you at every step. There is, however, another consideration, and that is that we seldom find it in a metallic state, but usually combined with some other element, and this is providential also, for it stands as a kind of mighty tempter, persuading and urging man to exercise his talents, and to exert his genius, so that that dirty-looking lump of red earth called Iron ore may, by the workings of a man's talents, ingenuity and genius, become the steel pen with which we write; and we say with truth that no one substance on the face of the earth has done so much in the development of man's latent powers, in rendering our lives comfortable and luxurious, and in advancing harmonious feelings, and free intercourse among the nations of the world, as Iron.

Let us now turn to the universality of its applications. We cannot turn our eyes or thoughts in any direction without finding some purpose of use or ornament to which this metal has been successfully applied, and its peculiar characteristics render it peculiarly adapted to fill the wants of man. It is easily melted, so that we can run it into molds of whatever device or pattern we wish; and when cold it is so strong and firm that it seems to be a work of nature rather than one of art. It is easily welded, and by this process can be readily joined in any part that is fractured, or it can be bent while hot to any curve or shape. It is tough, and will resist the strongest crushing strain; is not easily acted upon by the atmosphere; so it is just suited for the position we have given it in this nineteenth century, in which, amongst our necessities and luxuries, our real and imaginary wants, it holds the place of the King of Metals.

The Gyroscope Paradox.

On page 200, Vol. 11, SCIENTIFIC AMERICAN, we published, for the first time in this country, an engraving of the above curious toy. Since that time it has been discussed by all classes and shades of thinkers, and as a natural result, all sorts of theories and explanations of it have appeared. Considerable flourish has been given by some of our cotemporaries to a theory of Mr. McCarroll, of Canada, as probably the correct one. He shows that the ring and wheel remain suspended so singularly on one side of the upright, from the fact that the resistance of the centrifugal force of the wheel to any alteration in the plane of its motion is greater than the force exerted by gravity towards making it alter that plane. And as to the ring revolving round the point of the upright, in a direction contrary to that of the rotation of the wheel, he asserts that a wheel in motion does not impinge on the same point of the axis that it rests on when in a state of repose.

"For instance," he observes, "when a vertical wheel is set in motion, one-half of the body is acting in opposition to the laws of gravity, and the other half, so to speak, in the line of gravitation—hence the unequal discharge of forces on the axis On one we have gravity minus velocity. In so far, then, as the end on the axis is to be considered, the point of the heaviest impingement will be found on the plus side of the wheel. This being the case, the ring, which is free to obey any impulse given in its own plane, must necessarily retire before an excess of force exerted on the plus side of the axis of the wheel."

The centrifugal force theory is not new, and Mr. McCarroll is not entitled to the credit of suggesting it; as to the revolving ring, the explanation wants proof, as there is no law in nature which will enable us to say that "the ring which is free to obey any impulse given in its own plane must necessarily retire before an excess of force exerted on the plus side of the axis of the wheel."

The American Institute Fair.

On Tuesday, the 15th, the twenty-ninth Annual Fair of the above well known institute was opened at the Crystal Palace. Although the day was fine, the visiters in the morning did not seem to be very numerous, but in the evening there was a tolerably large assemblage collected to hear the opening address by the Hon. Mr. Meigs, whose annual appearance in this character is as steady as the motion of the planets. It was a plain, but common-sense review of the progress of industrial science during the past year. He made many valuable suggestions with reference to agriculture and the mechanic arts, and expatiated on the power of Great Britain to whip half the world with her immense engineering power, etc. After which a panorama of the Rhine was unwound before the admiring eyes of the juveniles, evidently much to their delight. A band (which played lustily during the speech) enlivened the evening with airs—national and general; and so concluded the opening ceremonies. We cannot help remembering the old proverb, that "if a thing is worth doing at all, it is worth doing well," as it applies with great force to the opening ceremonies of the American Institute. Surely a speech—however good—delivered at the end of a long, narrow and inconvenient picture gallery, with music playing and noises being made in all parts of the building, could scarcely be appreciated by the auditory; besides, the oration came off half an hour behind time. We would have it understood that this was no fault of Mr. Meigs, as he was there in time, patiently waiting for the Committee of Management to make their appearance and hear him. When the committee did arrive, (each with a scarlet rosette in his coat to denote his membership,) and gravely sat down, the proceedings commenced and ended with little or no edification to any one. If the Institute intends to continue these official openings, should they not be something worthy a great society, and not the hurried, unsatisfactory things that they are? We would advise them, in future, to discontinue the opening farce altogether.

Now for the Fair itself. From the present appearances we think it will be one of the best that has been had, although at first, from inventors not sending in their objects of exhibition early enough, much space remains to be filled up, which we have no doubt will be speedily done. There is much in the way of machinery, some unpacked and not set up, and some little not yet unpacked; so that, this week, it is impossible to give anything like a detailed report, as very few departments, if any, were completed at the time of our going to press.

There seems to be about the average number of novelties in all departments, each of which will be noticed in due time. As a sign of the growing importance of this exhibition, we hail with pleasure the presence of a six-cylinder printing press, manufactured by Messrs. Hoe & Co. for a German newspaper, the *N. Y. Staats Zeitung*. These famous presses enjoy the highest repute, not only here, but also in England, where the *Morning Star*, a London daily newspaper, and that mammoth of the press, the London *Times*, are, we believe, shortly to be printed by its aid. When these large manufacturers come in and show the products of their genius and capital, we cannot refrain from thinking that it is a very healthy and prosperous sign.

We observe, also, a new cotton gin, which is intended to gin the cotton in the field and send it out, not in the shape of raw cotton in the bale, but as yarn from the plantation. Should this be worth anything, it must be worth a great deal; but even should it be successful, and cheapen yarn at the South, we doubt not the active inventor would contrive some method whereby he could successfully compete with it. The machine was motionless, and, as no one appeared to offer any explanation of its operation, we are obliged to defer our notice until another time.

We also notice a case of saws and other hardware goods from Messrs. Hoe & Co., at the end of the north transept. It is arranged with taste and elegance, and the goods themselves are of the first quality.

The motive power for the machinery is to be supplied by three boilers, each about three feet in diameter and thirty feet in length, and ought to furnish a sufficient supply of steam for all the purposes of the exhibition. Already, on a pipe provided for the purpose, about a dozen steam and pressure gages are put into use, and more will probably be added. The engines that are to effect the transformation of steam into power are three in number, all with horizontal cylinders. One is complete and in action, and works beautifully, with a motion as steady and true as the upflowing of the tide. It is sixty horse-power, and made by Messrs. J. S. Bunce & Co., of this city. Of the others, one is made by Messrs. Hinck-lay & Egrey, of Bangor, Me., and is now ready for use. Its cylinder is twelve inches in diameter and three feet stroke. The third (made by Messrs. Corliss & Co., of Providence, R. I.) is not yet put up. These engines will convey the power to the shafting by belting in the usual way.

It is with feelings of pride that we look around on the spectacle presented to us at the Crystal Palace: the merry face of the visiter as he passes up and down; the anxious look of the inventor, as a small crowd gathers around his invention to hear him explain its merits, and his look of joy when they signify their approval of his effort; everywhere, all around, has the genius of man seemingly run riot; and you cannot ask for anything of ordinary use or popular appliance, for which there cannot be found an improvement to supply your want. In times of old, this fairy scene of busy life and useful purpose would have been regarded as the work of fairies and genii; but now, not having these beings at command, we have raised another, which we call the Genius of American Industry, and this we use. It is this that nerves the strong man's arm in labor, that supports the weaker woman in the factory, that cheers and encourages the inventor in his closet, and our sailors on every sea; and greater than all this is the spirit of genius which appears to rule in the opening Fair. We shall gladly chronicle its progress since the gathering and dispersion of its curiosities last year.

Among other novelties, Robinson's Patent Spring Stairs seems to attract general attention, if we may judge from the numbers we have seen running up and down them to try their effect, and they are certainly a very novel application of a spring. On the middle

stringer of a flight of stairs, a spring is placed under the top of each, and on this lies the stair top, being divided and hinged on the sides, so that when a person ascends the stairs he has the force of the spring to aid him in rising to the next, and in descending, the elasticity of the spring prevents the whole weight of the body from coming forcibly on the one foot, thus rendering "gitting up stairs" not such a fatiguing affair as in the ordinary solid stairs.

H. Getty, of Brooklyn, exhibits an Adjustable Hammock Berth. This invention consists in a convenient and comfortable mode of arranging the berths of ships. In the day time, it folds away and gives more room in the cabin; and at night, as it swings from two pivots, one at either end, however much the ship may roll, the occupier is perfectly quiet.

On a table in the south transept there are four models, each intended as an improvement on the usual form of ships' paddle-wheels; but we are sorry to say they are not of much practical use, as the nautical public do not seem to have sufficient confidence in them to ever adopt such contrivances. The first is composed of six floats, which, by means of an eccentric, feather themselves when leaving the water; and so large are the floats that they nearly form a perfect drum. The second is on the same general principle, having a greater number of smaller floats and a larger wheel. The third is a large wheel, having a number of small solid floats; their section is triangular, with slightly concave faces, and they are placed on an axis, so that each can rotate by itself when in the water. It is practically of no use; the friction is not so great, trnly, but the floats would simply revolve through the water, and exert very little propelling action on a ship. The last is a model of a method of arranging paddles without employing a wheel, and although the model is very small, it is almost as much as one person can do to turn it; what power it would take to turn a large one capable of propelling a vessel, it is beyond our arithmetical capacity to calculate. On the axle are fixed three eccentrics, arranged the same as a three-throw crank; round these are coupling joints, in the lower half of which are four paddles, radially placed, and the top of the couplings are fixed by means of levers. When the axle is turned, these paddles describe an elliptical arc, one-half in the water, the other out, and as four are always moving through the water, the inventor evidently thinks the ship would be propelled. It might be; but we should not like to pay the coal bills which an engine would naturally consume in its laborious efforts to drive the boat.

Every succeeding Fair of the Institute brings out a greater or less variety of devices which have not the merit of novelty, to say nothing of utility, to recommend them; and what is the more strange is that nearly all these old traps originate in, or very near to, New York city, the supposed centre of information. The four wheels above mentioned appear to have been born in this city within the past year. Arguing from this fact, and from our observations in the past, we believe that, in general, the mechanics and inventors of the country are better acquainted with the progress of invention than the same class in the city. We have reference to those who toil in the shop and at the lathe. Our city mechanics usually read story papers, and do not pay sufficient attention to the current progress of mechanical science.

Strychnine.

This poison, which has of late become so notorious in its abuse, (we cannot say use,) is the most uncertain in its action on the human frame; in some producing instant death; the same dose in others only bringing on tetanic convulsions, and in a lucky few no effect at all; and this does not appear to have any relation to the physical strength of the patient. It is a whitish crystalline substance, and is extracted from the nut of a tree called strychnine *nux vomica*. This tree grows in Ceylon, is of a moderate size, and has thick shining leaves, with a short, crooked stem. In the fruit season, it is readily recognized by its rich, orange-colored berries, about as large as golden pippins. The rind is smooth and hard, and contains a white pulp, of which many varieties of birds are very fond; within this are flat, round seeds, not an inch in diameter, covered with very beautiful silky hairs, and of an ash-grey color. The nut is the deadly poison which was well known and its medicinal properties well understood by Oriental doctors long before Europe or America had heard its name. "Dog-killer" and "fish-scale" are translations of two of its Arabic names. The natives of Hindostan often eat it for months, and it becomes a habit, like opium-eating, with the same disastrous results. They commence with taking the eighth of a nut a day, and gradually increase their allowance to an entire nut, which would be about twenty grains. If they eat directly before or after food, no unpleasant effects are produced; but if they neglect this precaution spasms result. The chemical tests for it are numerous, but only one or two can be relied upon as thoroughly accurate.

The British and American Patent Offices.

The London *Engineer* has the following article, comparing the English and American Patent Offices:—

"We had no idea of the cribbed, cabined, and confined nature of our own little nest, in comparison with the vast aviary in which we have been accustomed to be fleeced by our Transatlantic friends, before we had the plans drawn out on the same scale, or we think we should have hesitated to make such an *exposé* of our deficiencies; but the plans being prepared and promised to our readers, we feel bound to bring them to the light, let the consequences be damaging as they may. We had read of the sizes of the various rooms of the American office, as stated in the published description of it, and we had seen the plan; and, further, we knew well the ins and outs of our own Patent Office, but never, until the plans were placed side by side, did the comparison appear so ridiculous. We do not say that some of the closets of the American office are as large as our patent library, but really the space occupied by the entire building is so vastly greater than our own little jewel in Chancery lane, that we are at a loss to know what use can possibly be made of it. It is true that the plan of the American office, as we have given it, is not yet completed—one portion having to be built, and other portions being occupied by different departments of state; yet for all this, the building was designed for the Patent Office alone, and to the purposes of this office alone will it very shortly be devoted, so that we may justly conclude, from the size of the entire building, what views the Americans entertain of the importance of the patent business of their country. In one of *our* departments the space is so confined that we have recommended the attendants to wear spring shoes, so that they would, after a little practice, be able to jump over each other's heads; there being no room to pass between the shelves and the backs of the chairs of those sitting at the central table. With respect to the store department, there is only sufficient room in the corrugated iron out-house to contain a few copies of each of the printed specifications, which space will be wholly inadequate when the specifications of the patents granted under the old law are all printed. As to a museum of models, it does not exist, except in one of the boilers at Kensington; and as recent events, to which we referred last week, give signs of an explosion in that quarter, no safety-valve having as yet been discovered—it is not impossible that the models may again have to be placed in their respective cases, and consigned to the cellars from which they were taken. Now, this is all too bad, especially when we consider that the patent fund, notwithstanding the excessive fees of the law officers, has accumulated to the extent of about £100,000. Patentees will never, as was at one time suggested, have any part of this fund returned to them, and why, we want to know, would it not be as well employed in building a respectable office as in remaining in the Treasury? The business done in our Patent Office is not less important than that of the United States office; then what makes the difference in the views entertained as to the amount of space required for the proper transaction of that business? The real fact, we suspect, is that no difference of opinion exists as to the space required, but there are some undefined uses to which it is supposed the accumulated fund may be hereafter applied, and which time has not yet revealed. We beg to suggest that this expected revelation, when it is made, should be nothing more than that the whole fund, if necessary, should be expended in building a new Patent Office, containing ample space for every department, including a museum for models; and we venture to hope, further, that the revelation will show that a situation near Chancery lane is in every respect the best for such a building."

Carbon.

Carbon is surely a kind of sylph, or sprite, and that, too, of no ordinary sort. The caterpillar changes its coat, and becomes the gorgeous butterfly, and this astonishing transformation is the theme of the fabulists. Far more wonderful, however, is the change which takes place in a piece of charcoal. From a black, opaque, and almost worthless material, it changes to a brilliant gem—the diamond, which even the stars are likened to. It certainly appears incredible that the diamond, so transcendently beautiful, sparkling with more brilliancy than the dew-drop at sunrise, should be nothing else than a bit of charcoal, but so it is. Not here, however, does the chameleon power of carbon rest, for by another change it becomes invisible. In such a state it exists in the brightest, purest air. By another change it becomes the thick, heavy flakes of smoke which we see roll out of ill-constructed flues—the "blacks" of London and Birmingham. Coal is but impure carbon, hence it is often spoken of as the "black diamond," signifying, however, as much the intrinsic value of coal to man as its chemical relationship to the sparkling gem. How the world would fare without carbon it would be difficult to say, for it forms the major part of the vegetable and animal creation. Tallow is white, but it is composed of nearly all charcoal (that is, carbon,) and the elements of water. So also with starch, sugar, spirit, gas, chalk, shells, bones—all contain carbon; they would, in fact, cease to exist without it. If we make a mixture of sulphuric acid and sugar, a volcanic commotion ensues. When all is over, and the black residue washed, it is found to consist of nearly pure charcoal (or charbon, as the chemists in France call it,) or carbon, as the English write it—having a dislike to the *h*. The purest carbon or charcoal with which the chemists are acquainted is the diamond; but even this valuable stone, when burned, shows by its ashes that it is of vegetable origin. Looking at carbon, therefore, either in its black or white condition, and knowing that it exists in the atmosphere around us in an invisible state, we need not any knowledge of chemistry or physics to enable us to come to the conclusion that few substances exhibit the infinite power of the Creator more than carbon.

SEPTIMUS PIESSE.

The Action of the Sea.

That ever restless mass of water, called the sea, or ocean, is the great agent in producing the physical changes of the globe. It is the only workman who never rests—always working, always toiling, for the good of man. It is continually wearing away the rocks and beaches of portions of our coasts, and carrying the matter onward in its currents, to form islands or to add to continents in other places. The motion of the waves produces a sifting action, and only the heavy matter falls to the bottom, while light alluvial soil and small sand is held suspended in the upper strata of the water. We can realize the force of the waves in wearing a coast by remembering that in a hurricane the force of the waves are equal to a pressure of forty tuns to the square foot of coast surface. What can withstand this? We feel that all our breakwaters and stone walls must give way in time, however long that time may be. The buildings of man must fall before the forces of Nature.

Mathematics.

Mathematics is the most noble and elevated science the human mind can investigate or study. Each question that the student undertakes to solve, when accomplished, but leads to another and a higher, and thus leads the intellect to consider and grapple with the grandest realizations of truth in our universe. All other sciences (except those relating to living beings) are based upon it. Astronomy, its eldest child, and Mechanics, its most useful servant, are but practical mathematics. How grand and noble to calculate the distances of stars, the motions of the planets, and to prophecy the appearance of a meteor! and how useful and glorious, as advancing true civilization to calculate the horse-power of a steam engine, to estimate the extent of a bed of coal, or to determine the practical strength of iron! All these are done by the aid of this science, and the world teems with objects for its investigation.

Loss of the Central America.

This steamship left Havana for New York on the 8th inst., having on board about six hundred passengers, chiefly returning Californians, and $1,600,000 in specie, which was lost beyond recovery. Up to Saturday, the 12th, they had a storm, which increased in violence, and on that night the ship foundered, when five hundred passengers, it is supposed, were lost; the remainder were saved by various vessels sailing in the vicinity. No more particulars had been received up to the hour of our going to press. This calamity will sadden the circle round many a household fire, and in place of the look of pleasure and cry of joy which would accompany the welcome home of every one who had been toiling for years in the land of gold, we shall only see the look of anguish and hear the wail of grief.

The Great Eastern.

At a late meeting of the Eastern Steamship Company, it was announced that the vessel may be launched in September, but that the trial trip to Portland, Maine, will be deferred to the April following. Her total cost will amount, including all contingencies, to about three millions of dollars, of which nearly one remains to be met. Of this, $160,000 will be provided by calls at present in arrear, and to supply the balance of $490,000 the directors are empowered to borrow $500,000 upon debentures.

Ventilation of Cars.

In traveling by railroad, the unfortunate individual who chances to be in the cars all night must either catch a severe cold, by having one or more windows open, and in dry weather nearly choked with dust, or else poisoned with the malaria arising from the burning of lamps and breathing of passengers. Surely this can be remedied. It would cost the railway companies but little to adopt some of the known systems of ventilation which would answer all the purposes required, and they would be amply repaid by the increased comfort of their patrons.

The Parisian newspaper, *Galignani*, says:—"M. Babinet, the astronomer, has just announced to the Institute that, in consequence of a favorable change in the currents of the ocean, a series of years of heat has been entered on, of which the present is the commencement." We can only say that, if this is the first year of M. Babinet's series of years of warmth, it is the coldest that has been known in the United States for a long time. However true this fact may be as regards Paris, it certainly has not affected New York.