Scientific American.

ESTABLISHED 1845.

MUNN & CO., Editors and Proprietors.

PUBLISHED WEEKLY AT

No. 361 BROADWAY, NEW YORK.

O. D. MUNN. A. E. BEACH.

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One copy, one year, for the U. S., Canada or Mexico.....$3 00
One copy, six months, for the U. S., Canada or Mexico..... 1 50
One copy, one year, to any foreign country belonging to Postal Union. 4 00
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The Scientific American Supplement

is a distinct paper from the SCIENTIFIC AMERICAN. THE SUPPLEMENT is issued weekly. Every number contains 16 octavo pages, uniform in size with SCIENTIFIC AMERICAN. Terms of subscription for SUPPLEMENT, $5.00 a year, for the U. S., Canada or Mexico. $6.00 a year to foreign countries belonging to the Postal Union. Single copies 10 cents. Sold by all newsdealers throughout the country. See prospectus, last page.

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NEW YORK, SATURDAY, NOVEMBER 3, 1894.

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(Illustrated articles are marked with an asterisk.)

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SCIENTIFIC AMERICAN SUPPLEMENT

No. 983.

For the Week Ending November 3, 1894.

Price 10 cents. For sale by all newsdealers.

THE AEROPLANE IN THE PATENT OFFICE.

Since the days of Deucalion man has always desired to fly. Leaving out of consideration mythical accounts of flight, the first successful venture was that due to the invention of the balloon. The Montgolfier balloon established the possibility of flotation. But this is not flight. The dirigible and self-propelling balloon has not yet attained practical success. But self-propelling flying machines without balloons, working on the helix or aeroplane principle, are common, at least in the shape of toys. The aeroplane has been the subject of some very curious investigations by Prof. Langley, of the Smithsonian Institution, and Hiram Maxim, in England, has constructed a flying machine of full working dimensions. Our readers have been kept fully informed in these matters. In the SCIENTIFIC AMERICAN and SUPPLEMENT the most recent developments in aerial navigation have been presented, and but a few weeks have elapsed since we chronicled the last trial of the Maxim machine, at which it actually left the lower tracks and executed flight for a short distance.

Mr. Maxim naturally desired to secure a patent in the United States, and, regarding his complicated machinery as a unit, wished to patent the whole as a flying machine. But the Patent Office objected, and, refusing to take his view, stated that a number of distinct applications should be made to cover the devices used.

Much against his will, the inventor altered his application, and while still applying for a fundamental flying machine patent omitted much which he felt should be included. But he ran against another obstacle. The examiner, after noting that the application had been restricted to cover the air ship alone, notified the applicant that a working model was required. This was reasonable enough perhaps. But the next statement of the examiner, one absolutely committing in its tenor, states that "It is held that the invention is incapable of practical operation, since, without the assistance of a gas field or equivalent the device will be incapable of ascension." By the curious expression "gas field," a gas bag or balloon is meant. Mr. Maxim has criticised the action of the Patent Office very severely in the London Engineering, considerable correspondence has been elicited, and wide publication has been given in the scientific journals to the strictures in question. As Mr. Maxim's air ship represents the most advanced work in aeroplane flight, the action of the Patent Office amounts to a ruling that aeroplane flight is impossible. Right on the heels of this widely published decision comes the account of the trial of July 31, when the machine carrying three people developed so much ascensional power as to break away from restraint and actually to perform a short flight.

In the words of the old story. the flying is all right, the trouble is in the alighting. Meanwhile the Patent Office goes on record as disbelieving in the possibility of aeroplane flight. Langley's and Maxim's experiments carried out by apparatus swept through the air on rotating arms went to prove the possibility which the Patent Office denies. It is bad enough for the inventor to be told that a flying model is required, when the Maxim air ship is such that it can hardly be reproduced in miniature, but it is still worse for the office to go out of its way and state that a "gas field" is required to render the device operative. Mr. Maxim very naturally doubts whether a balloon would remain harnessed to his ship. The theory of action of the aeroplane requires rapid progression, precisely the thing which it is most difficult to obtain with a balloon, and the action of his machine would be most seriously hampered by one.

The air ship must travel forward very rapidly; a balloon would be an obstacle to what may be termed its operative progress. Precisely the thing which the Patent Office declares essential to operativeness would render it inoperative. If a general ruling for aeroplane cases has been promulgated, it should certainly be rescinded as quickly as possible. Otherwise inventors of machines of this class will have to top their structures with a balloon, neither useful nor in accord with the principle of their inventions.

The Institute of Sociology.

The first congress of the International Institute of Sociology assembled on October 1, in Paris.

Sir J. Lubbock, the president, in opening the proceedings, deplored the fact that historians had so much neglected the social side of history. Page after page was devoted to wars and battles and struggles for power, while the social condition of the people was dismissed in a sentence or two. In the course of his address Sir John Lubbock also said:

International associations such as that now founded are of importance from three points of view. The mere fact of bringing together representatives of different nations establishes friendships which do something, and will by degrees do more, to prevent those misunderstandings and misapprehensions which between nations, as between individuals, often are the foundation of grave disputes. In the second place, they bring together men who have devoted themselves to similar studies and give them the opportunity of consultation, of comparing their opinions, and of friendly though critical discussion. Thirdly, they enable each nation to profit by the experience of others. Two dangers which mainly retard our progress and threaten our future are the wars of nations and the wars of classes. As regards the first, our condition in Europe is very serious. Our peace establishments comprise nearly 4,000,000 men; those for war approach 20,000,000. The nominal cost is over £200,000,000, but, as the Continental armies are mostly under conscription, the real cost is much larger. As a consequence of this colossal expenditure the public debt of Europe is continually increasing. This appalling debt is represented by no valuable property, it has fulfilled no useful purpose, but has been absolutely wasted or even worse. Moreover, the economic conditions which necessarily result are very grave. Taxation is increasing, the hours of labor are longer than would otherwise be necessary; all this is a serious reflection, not only on our moral, but on our common sense. In our own case one-third of the total taxation goes to pay for the wars of the past, one-third is spent in preparing for the wars of the future, and only one-third remains for the needs of the country itself. It is impossible for any one to contemplate this gigantic military expenditure without the gravest forebodings. Even if we avoid war, the expenditure must inevitably lead some of the European nations to bankruptcy and ruin. In fact, we never have any peace now; we live practically in a state of war, happily without battles or bloodshed, but not without terrible suffering. In fact, the religion of Europe is the worship of Mars. This state of things is discreditable to a civilized continent. There may be some excuse for barbarous tribes who settle their disputes by brute force, but surely we who pretend to be civilized should aspire to a better system of settling international questions. We have such a system, namely, the principle of arbitration, and I hope we may adopt it more and more.

Another form in which the demon of war threatens the future is the struggle of classes—not only that for higher wages, not merely that as it is called between capital and labor, as if capital could be utilized without that most exhausting form of labor, the labor of the brain, but as we have seen in several cases lately between different trade unions. This is, if a less bloody, not a less deadly form of human contest. In England we have suffered greatly from strikes, and I doubt whether the workmen have not suffered more than the employers. No doubt wages have risen, but it has been questioned by high authorities whether they would not have risen still higher if there had been no strikes. Lord Armstrong has pointed out the effect strikes have had in discouraging manufacturing enterprise, and thus diminishing the demand for labor. I believe that most manufacturers would agree with his view. Among domestic servants and in many parts of the country in the case of agricultural laborers, though there are practically no unions and have been no strikes, the rates of wages have equally risen, and the conditions of employment have been substantially improved, and this although the agricultural interest has been very much depressed. The ordinary boards of conciliation, however valuable, have one great defect, that the interests of employers and employed are, at least in appearance, directly opposed. We have, however, in London organized a conciliation board, which is ably presided over by Mr. Moulton, on a wider basis and one I think more likely to be ultimately successful.

After criticising the various systems of popular representation in vogue, and declaring his belief that in some form or other proportional representation would in time be generally adopted, Sir John Lubbock referred to the great decrease of crime in England under educational influence. He concluded: I am, however, far from thinking that we have yet arrived at the best system of education. It is still too much confined to books and words, and we do not bring our children sufficiently into contact with nature herself. Aristotle well said that "The hand is the instrument of instruments, and the mind is the form of forms," and we must train the hand and the eye, and then train and rely on the memory.

The congress continued its sittings on October 2 and 3, when papers were read by M. De l'Estrade on the division of the soil, by M. Enrico Ferri, an Italian deputy, on socialism, and by M. Rene Worms on science and art in sociology.

The Temps, discussing Sir J. Lubbock's address, expresses surprise that the spread of education has reduced crime in England, whereas in France it has had a contrary effect.

GARDENING for women is engaging attention in Germany, and a horticultural school for girls and women is about to be opened at Berlin. The principal is Fraulein Elvira Castner, who first mooted the idea in a paper read before the Berlin society, Frauenwohl. It is proposed to teach all branches of gardening, and to devote special attention to the production of fruit.

Unwelcome Discoveries.

Modern science has made many a wonderful discovery, but unfortunately not all of its discoveries are welcome. It has revealed the beautiful processes of nature, but it has also revealed her destroying agencies. The more closely man has studied, the more complicated has he found conditions and the more dangers has he recognized. Where all is outwardly lovely, he has found inward harm. The microscope has disclosed minute horrors, none the less horrible because minute. The telescope, as it sweeps the heavens with its far-seeing eye, has foretold stupendous catastrophes. Much that was thought beneficial has been proved dangerous, and much that was thought harmless has been proved fatal. It has been demonstrated that hand in hand with benefits stalk injuries. Great good is always attended by satellites of little evils.

Years ago people lived in calm confidence that whatever is, is right. They had faith in all things. To-day people have faith in nothing. They are like pilgrims walking through the valley of the shadow of death, feeling thick about them horrors they could not see. They have learned that the very air, once considered a life-giving nectar, is peopled with ferocious microbes seeking whom they may devour. They imagine their insidious enemies perched on restaurant chairs, sitting atilt on the passing coin, flying from shoulder to shoulder in the jostling crowd. They have learned that the water they drink swarms with life and carries germs of dread disease. They have learned that one article of food is bad for the nerves, another heats the blood, another is hard to digest, and so on through all known menus. They have learned that imperfect sanitation and ventilation endanger health, and that proper conditions are, moreover, very rarely attained. Nor is it in everyday affairs alone that science has pointed out the dangers that await man. Through all the realm of human interests it has conjured up evils. Its warning cry runs the gamut of calamities from the danger of not exercising enough up to the danger of the race multiplying too fast for the earth to support it and the equally dramatic danger of the earth flying from its orbit and rushing into the warm embrace of the sun.

Sensitive souls are reduced to a state of abject terror when they think of the small chance man has of life, health, and prosperity, in the face of these ogres of science. What shall they eat, wherewithal shall they be clothed, what can they in safety do, when in all things lurk death and disaster? They dare not indulge their pet weakness for coffee. They eschew their favorite dainties. They fear to come in contact with their fellows or to touch the railing, counter, or car strap, touched alike by all sorts and conditions of men. They fear contagion in the doctor's office and blood poisoning from his knife. They fear a thousand things in daily life. Meanwhile they still live.

Certainly science has evolved much truth, and its warnings are worth the heeding. But the warnings of science, like all other advice, should be referred to a judicious committee on common sense. It should be remembered that doctors sometimes disagree, and the verdict of one authority, or a half dozen, is not necessarily the verdict of science. Moreover, a truth may be too sweepingly applied. Circumstances and individuals differ, and what will hold good in one case needs modification in another. It seems to the hardened and incredulous that if life be really so beset with dangers, it is passing strange that generation after generation should have lived and thrived in their midst, and this also without a knowledge of their existence. If our ancestors, knowing nothing of these wonderful discoveries of hidden evil, managed to avoid the pitfalls, why not we? Does mere knowledge of danger make one more susceptible to its effects? Where is the wisdom that should accompany increasing knowledge? Natural living and confidence in nature are the best safeguards against such evils. Common sense is the best of disinfectants and work the best of remedies.—Minneapolis Times.

Dangerous Chemicals in Photography.

Attention has lately been called to the injurious action exercised by metals on the hands of photographers, which it is asserted may be avoided or the ill effects be at least reduced to a minimum. Thus, in the development of negatives, only the extreme tips of the forefingers and thumbs need be wet with the solution, and then only the front portions of them, where the skin is the thickest; in most instances, in fact, in handling injurious chemicals, it is only when they come in contact with the thinner portions of the skin, as on the back or between the fingers, that any harm results. Briefly, India rubber finger stalls, of but the slightest cost, will perfectly protect the fingers from all pernicious materials, and, being exceedingly thin, are by no means uncomfortable to work in. It is noted, in this connection, that the effect of chemicals is strongly different on different individuals. Thus, an instance is cited of one who had dealt for years, and with impunity, with cyanide of potassium in connection with electroplating as well as photography, but suffered severely from bichromate of potash; another, on whom the bichromate was innocuous, even when used on a large scale, could scarcely touch cyanide without suffering inconvenience—even the smell of the substance subjecting him to nausea and headache.

The Earliest Electric Passenger Boats and Passenger Cars.

The earliest passenger boat propelled by electricity is believed to have been that of Prof. Jacobi, of St. Petersburg, Russia. In 1838, on the river Neva, he had such a boat. It was 28 feet long, 7 feet wide, and carried 14 persons. The electric motor was operated by means of 320 Daniell cells.

The earliest passenger car propelled by electricity is believed to have been that of Alexander Davidson, of Edinburgh. It was in operation in October, 1842, and is thus described in the Edinburgh Evening Journal of that period:

"ELECTRO-MAGNETIC RAILWAY LOCOMOTIVE.

"A trial of this very ingenious machine, constructed by Mr. Davidson, was made last month on the Edinburgh and Glasgow Railway, in presence of a number of gentlemen, many of whom were eminent for their scientific knowledge. The construction of the carriage is the first attempt which has been made in this country to apply the powers of electro-magnetism to railway traffic, and from the success which attended this trial, sanguine hopes may be entertained that the period is not distant when it will either supersede, in many cases, the employment of steam, or lend a powerful aid to this mighty instrument in all the operations in which it is at present employed. The carriage was impelled along the railway about a mile and a half, and traveled at the rate of upward of four miles an hour, a rate which might be increased by giving greater power to the batteries, and enlarging the diameter of the wheels. We understand that the carriage was built at the expense of the railway company, and we cannot but congratulate them in having the discernment to employ Mr. Davidson, a gentleman of much practical knowledge and talent, to whose genius great discoveries have been made in electro-magnetism, by whom the carriage was projected, and to whose unwearied exertions the practicability of the scheme is almost placed beyond a doubt.

"The dimensions of the carriage are 16 feet long by 7 wide, and is propelled by 8 powerful electro-magnets. The carriage is supported by four wheels of 3 feet diameter. On each of the two axles there is a wooden cylinder, on which are fastened three bars of iron at equal distances from each other, and extending from end to end of the cylinder. On each side of the cylinder, and resting on the cylinder, there are two powerful electro-magnets. When the first bar on the cylinder has passed the faces of two of these magnets, the current of galvanism is then let on to the other two magnets. They immediately pull the second bar until it comes opposite them. The current is then cut off from these two magnets and is let on to the other two. Again they pull the third bar until it comes opposite, and so on, the current of galvanism being always cut off from the one pair of magnets when it is let on to the other.

"The manner in which the current is cut off and let on is simply thus: At each end of the axles there is a small wooden cylinder, one-half of which is covered by a hoop of copper; the other is divided alternately with copper and wood (three parts of wood and three of copper). One end of the coil of wire which surrounds the four electro-magnets presses on one of these cylinders on the part which is divided with copper and wood; the other end of the coil presses on the other cylinder in the same manner. One end of the wires or conductors which comes from the battery presses constantly on the undivided part of the copper on each cylinder. When one of the iron bars on the wooden cylinder has passed the faces of two magnets, the current of galvanism is let on to the other magnets, by one end of the coil which surrounds the magnets, passing from the wood to the copper, and thereby forming a connection with the battery. This wire continues to press on the copper until the iron bar has come opposite the faces of the two magnets, which were thus charged with magnetism. On its coming into that position, the current is cut off from these two magnets by the wire or rod of copper passing from the copper to the wood, and thereby breaking the connection with the battery. But when the wire or rod of copper leaves the copper on the one cylinder, it leaves the wood and passes to the copper on the other cylinder at the other end of the axle, and in so doing connects the other two magnets with the battery, and they pull the next iron bar in the same manner. At the other end of the carriage there are other four magnets and wooden cylinder, with iron bars arranged in the same manner.

"The battery, which is used for propelling the machine is composed of iron and zinc plates immersed in dilute sulphuric acid, the iron plates being fluted so as to expose greater surface in the same space. The weight propelled was about six tons."

High Voltage Electric Shock Produces Insensibility to Pain.

Dr. P. S. Donnellan, M.D., of Philadelphia, writing to the Medical News, describes a case occurring in the practice of his colleague, Dr. W. M. L. Coplin, as follows:

On the 20th of April, 1894, J. R., aged 44 years, while engaged in repairing broken wires for the Bell Telephone Company, grasped the ends of a wire that had crossed an electric light wire conveying one thousand volts. He received the full force of the current through his body and was immediately rendered unconscious. He was thrown violently to the ground, and could not be released until the current was broken by a fellow lineman, who cut the wires apart with a hatchet.

The man was brought to St. Mary's Hospital within half an hour of the accident, and I saw him a few minutes after his admission. He was in profound coma, with pupils widely dilated and irresponsive to light, breathing stertorous, face pale, and bathed in perspiration. About ten minutes later he vomited, and then became wildly delirious, so that it required the combined efforts of three men to keep him in bed. He moaned and cried incoherently, and tonic and clonic convulsions of a severe type succeeded each other with great rapidity. At this time we were unable to take his temperature on account of his extreme restlessness, but to the hand it appeared about normal. His respirations now lost their stertorous character, and became more of the Cheyne-Stokes variety, averaging about ten per minute for two hours after his admission. The pulse was 80 per minute, of high tension.

The man was given morphine by hypodermatic injection; and as the delirium and convulsions did not abate, the injection was repeated and soon afterward he gradually quieted down. As his respirations were alarmingly feeble, he was given strychnine by hypodermatic injection with excellent effect. He fell into an apparently normal sleep, from which he awoke four hours later, conscious, but slightly dazed, and feeling, as he expressed it, "tired and sore all over." On my visit to the hospital next morning I found that he had slept well during the night; his temperature was 98·8, his pulse 72, his respiration 18. He complained of pain from a number of severe burns that he received during his contact with the wire. These burns were distributed irregularly in lines over the back, arms, and legs, and evidently were caused by the intensity of the current, as the clothing which covered the affected areas showed no signs of having been scorched.

On questioning the patient as to the nature of the accident, he remembered perfectly all of the incidents of his morning's work up to the time that he grasped the wire that conveyed the shock through his body. After that moment he had not the slightest knowledge of what had occurred, and did not suffer the least pain until he awoke at 6 P. M., as already stated, to find himself in bed in the hospital. The patient made an excellent recovery.

In view of the employment of electricity by the authorities of certain States for the purpose of putting condemned criminals to death, the facts of the case related are of interest.

In another case elsewhere, according to the statement of our patient, he was absolutely insensible to pain from the instant he received the shock; even the actual discharge of the current caused him no suffering; and were it not for the burning of his skin, he would not have been aware that he had met with an accident.

While it is to be regretted that the public is greatly exposed to accident from contact with currents of high tension on account of the almost universal employment of electricity as a motive and lighting power in our large cities, it seems to me that, so long as capital punishment has to be enforced as a legal penalty, the electric current, properly applied and of sufficient high tension, is the most humane agent yet devised for putting condemned criminals to death.

Shortsightedness.

In the public schools of France 24·2 per cent of the scholars are shortsighted, in those of Germany 35 per cent, and in those of the United Kingdom 20 per cent. The percentage of myopy is highest in the classes of rhetoric and philosophy. The hygienic condition of the school does not seem to affect it, but in the opinion of Dr. Martin, a French authority, want of physical exercise is the chief cause of it. By modifying the work of the classes, and allowing reasonable spells of exercise between them, the proportion of myopy in the college of Giessen fell from 26 6 to 17 per cent in five years.

The Great Search Light.

The great search light made by the General Electric Company and which was exhibited at Chicago, afterward at the Winter Exposition, San Francisco, has found a final home and resting place at Mt. Lowe, Cal. It is estimated the rays of this wonderful light can be seen at a distance of two hundred miles, when the air is clear.