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(Illustrated articles are marked with an asterisk.)

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SCIENTIFIC AMERICAN SUPPLEMENT No. 936.

For the Week Ending December 9, 1893.

Price 10 cents. For sale by all newsdealers.

"GASOCUTION."

The editorial in your issue of November 18, on "Death by Gas Asphyxiation," prompts me to suggest a question which has often occurred to me, as it doubtless has to others, why this would not be the best method of executing the death penalty upon criminals. Hanging is shocking to the finer sensibilities of mankind, and "electrocution" is not considered by many as altogether satisfactory; but execution by carbonic acid gas would be free from every objection that could be brought against either of the methods named. For instance, let a cell be constructed which, to a certain height, would be gas tight. The upper portion could be freely ventilated, so that it could be used for ordinary purposes. All that the prisoner would need to know would be that he entered that cell never to come out alive; and when reclining upon his couch the gas could be turned in till it enveloped the sleeper, who, without waking, would pass quietly away. Or, if it be desirable to let the prisoner know when he is to be executed, he could be confined upon his couch or chair and the gas introduced, which would not reveal its fatal presence till it reached the requisite height, when, as you show, the person would instantly become unconscious, and soon cease to live. Then, by some simple process, the gas could be exhausted from the cell and the body removed. In this case the death would be painless and absolutely sure. The process would be free from all sensationalism or ghastly accompaniments. It would require no expensive plant, machinery, or operators, and would be in harmony with the highest dictates of humanity. Is it not at least worthy of consideration? URIAH SMITH.

[The system of inflicting death by electrocution is undoubtedly successful, but none the less is an absurdity as regards expense and complication of apparatus. When we consider that the puncture of a needle can kill, the use of an expensive electric plant for the purpose seems unnecessary. The execution by carbonic acid gas, in the style of "Armadale," is also clumsy, as a great quantity would be required to fill a room to the necessary height. But by the use of illuminating gas one or two cubic feet would do the deed. A simple tin box could be placed over the criminal's head and gas could be turned into it. In a few minutes painless death, without mutilation, would ensue. The method would be certain, and the apparatus would cost little. Death would not be instantaneous, but it is questionable if society does not carry its philanthropy too far in its efforts to provide euthanasia for brutal murderers. —ED.]

THE WRECK OF THE LOUISE H. RANDALL.

The past week has witnessed a scene enacted on the shore of Long Island which brought near to our doors the battle of human life with the elements, and which, after long agony of suspense and suffering, ended happily. We allude to the wreck of the schooner Louise H. Randall. Carrying a heavy cargo and caught in a gale off the inhospitable shoals of the southern shore of Long Island, she grounded. She was at once seen some six hundred yards distant from shore, and the life savers began to congregate on the beach near her. The first thing to be done in such a case is to get a boat to the wreck. The use of the life boat is preferred to the breeches buoy when it can be used. But, after repeated and desperate efforts, the attempts to get a boat offshore were abandoned as useless. The wrecked vessel meanwhile lay in full sight of the shore, with hull immersed and her crew and officers with the captain's wife fastened in the masts and rigging. What their thoughts must have been as they saw the crowd on the shore and no boat putting off can be imagined.

The mortars and life lines were next tried, and shot after shot was discharged all falling short or missing the vessel, except two. These fell across the hull only to be cut by the wire rigging. In face of the gale and distance of the vessel from shore, the Federal Life Saving Service was helpless. Private assistance had to be invoked. The powerful seagoing tug of a wrecking company was dispatched from New York, eight hours distant, and reached the scene in time to rescue the unfortunates, who for a day and a night had been exposed to the sea and wind on the masts of the sunken vessel. Had the wreck occurred in January or February, probably all would have been lost. Human ingenuity and the philanthropic spirit of a great government proved unable to throw a half inch rope over a vessel in plain sight off a level sand beach. A number of life saving crews were assembled, but they could do nothing.

Our life saving service is admirable in many respects. Its use of light surf boats in place of the heavy life boats used in England is characteristic. The English type could not be launched from our sand beaches. The same thing operates against the use of steam life boats. But where a coast is so notoriously unsafe as that bordering on the bay of New York, it would seem possible for the life saving department to maintain a steamer ready for instant call to the relief of a distressed vessel, anywhere from Montauk Point to Barnegat. It would also seem possible for more powerful line-throwing apparatus to be provided.

Another striking feature may be noticed. Life saving operations are always operated from the shore. But would it not be possible for a ship to do something herself? The use of drags to carry a line to shore has been proposed, and Professor Davis' kite gives some suggestion to the shipwrecked. When a captain finds his ship going ashore, if he could but secure enough light line, it should be a simple matter to rig up some kind of a float which would, under the influence of the wind and "send" of the breakers' crests, carry the end of the line ashore. This would give the necessary facilities for carrying out a breeches buoy tackle. In the accounts of the wreck it is said that even the empty donkey boiler was carried ashore. This would have had power to carry the end of a heavy rope on shore had a long enough one been at hand. Life and death hinged upon getting a line across six hundred yards of water, and it could not be done.

The account of the wreck and rescue reads like a romance in every detail. The work of the life saving crews was heroic, if ineffectual. But it should have been effectual.

Manufacture of "God" Money in China.

A correspondent of the *North China Herald*, writing from the interior of Kiangsu province, mentions that one of the industries there is the manufacture of mock money for offering to the dead. Formerly the Chinese burnt sham paper money, but in these days of enlightenment and foreign intercourse the natives of Soongkong, Hangchow, and other places have come to the conclusion that dollars are more handy to the ghosts than clumsy paper money. Hence they now to a great extent supply their ancestors and departed friends with mock dollars. These are only half the size of real dollars, but there appears to be no more harm in cheating the dead than there is in cheating the living. Besides, the deceased are not supposed to know the difference, for many of them departed this life before silver dollars were imported into China. A hundred mock Carolus dollars, done up in boxes, are sold for 34 cash. The operation of making this money is interesting. First of all there are blocks of tin which are melted down and then poured between boards lined with Chinese paper, and when the upper board is pressed down on the lower, a thickness of tin remains. This is next cut up into strips four inches long, one wide, and an eighth of an inch thick. Some ten of these strips are placed evenly together, one on top of the other, and one end is held between the fingers, when the workman proceeds to hammer them out till he has beaten them so fine that they are now three feet long and a foot broad, and so thin that they are not thicker than the thinnest paper. This is next pasted on common cardboard, which is then cut with a punching machine to the size of half dollars, and this having been done, a boy takes the cut-out pieces in hand and with two dies, one representing the one side and the other the reverse, hammers impressions of dollars on them, and the money is ready for use.

Another very curious instance of the practice of cheating the gods is recorded in the same journal, but from quite a different part of the country. It appears that districts of the Anhui province have lately been ravaged by an epidemic, so that in many places the people were unable to attend to the harvesting of the crops. An attempt was then made to deceive the gods by "playing at" New Year's Day, and pretending that September 1 was the first day of the new year. Every preparation for celebrating the bogus new year was made, such as burning fire crackers and pasting happy sentences in red paper on the doors. The object was to make the god of sickness think that he had made a mistake in the seasons and had erred in bringing an epidemic on the people at a time when no epidemics in the course of nature should appear. As any action contrary to nature done by the gods is liable to punishment by the King of Heaven, the actors in this farce thought that the god of sickness would gather his evil spirits back to him for fear of the displeasure of his superior divinity. This child's play received the permission and co-operation of the local authorities, but so far no visible effects for the better are apparent.

Recruits of the American Army.

The *Army and Navy Journal* says: Of the nearly 10,000 men enlisted in the army during the past year, seven placed themselves on record as lawyers, three as dentists, two as chemists, thirty-nine as druggists, six as newspaper men, eight as civil engineers and surveyors, two each as actors and artists, four as draughtsmen, and sixty-two as school teachers. Twenty-six students entered, thirty-nine salesmen, thirteen photographers, and one doctor. One music teacher and a piano tuner were accepted, and are now in service; carpenters numbered 204; painters, 106; cooks, 108; machinists, 106; butchers, 104; printers, 95; and bakers, 91. Of 86 who gave no occupation, 78 were

Indians and 8 white men, and of the 2,240 laborers enlisted 13 were Indians. Farmers numbered nearly 1,200; clerks, 377; farriers, 16; blacksmiths 96; teamsters, drivers, and coachmen, 376; horsemen, 2; horse trainers, 3; liverymen, 2; jockeys, 2; riding teacher, 1; and hostlers and grooms, 92. The bookkeepers were 52 in number; stenographers, 7; hotel clerks, 3; typewriters, 2; and shipping clerk, 1. There were besides 86 tailors, 77 miners, 78 barbers, 75 engineers, 74 shoemakers, and 69 sailors.

Solar Cautery as a Remedial Agent.

We give a brief abstract from an article on this subject, by Dr. A. V. Thayer, published in the *Pacific Medical Journal.*

During a practice of more than a quarter of a century I have found no caustic or cautery to compare with solar heat in its beneficial results. Unlike other caustics, it can be applied with perfect safety upon the most delicate tissues, and is at all times under the control of the operator. It has other advantages—the system receives this treatment kindly. The irritation and inflammation following its application is surprisingly slight and of short duration. Another point in its favor, the pain subsides immediately upon the removal of the lens. I have burned the skin of nearly the whole of one side of the face at one sitting, destroying the cuticle; within five minutes the burned surface would be free of pain. There is a curative power in the chemical rays of the sun yet unexplained. I avoid blistering, carrying the burning beyond this point, carbonizing the tissue.

In the treatment of morbid or malignant growths we destroy most fully the morbid products. Upon this depends the success of the operation. The morbid tissues having less vitality than the normal, succumb to the cautery before the natural structures adjoining are injured. This enables us to attack boldly the malignant or morbid growths without any fear of injury to the healthy tissues surrounding them.

In the primary treatment of chancre, or chancroid, this treatment stands unrivaled. Within the space of two minutes the infectious chancroid, or the true Hunterian chancre, is deprived of its contagion and changed to a simple ulcer. Hemorrhoidal tumors, when external to the sphincter, are bodily destroyed, and the part heals without unpleasant symptoms. Indolent ulcers of long standing take on new life after the application of solar heat. In the course of a few days healthy granulations appear, which continue to a favorable termination, especially when the general health is looked after. Granular surfaces which are inclined to bleed from the slightest touch are changed to a healthy state. Hemorrhages from small arterial or venous vessels are checked almost instantly with the solar cautery.

Diseases of the skin of a parasitic nature are treated with marked success. Cases that have withstood the repeated attacks of the usually prescribed remedies have succumbed to one or more applications of solar heat. I believe that the pustules of smallpox can be aborted, and pitting prevented with this agent.

What seems surprisingly strange to me is the fact that a remedy of so much curative power and value, and one so easily utilized, should have remained unknown to the medical profession so long.

[If medical men were more careful to read the pages of the SCIENTIFIC AMERICAN with regularity, they would keep themselves posted in respect to the latest and most valuable medical discoveries. The use of the solar cautery was the discovery of Augustus Barnes, of Southington, Conn., was patented by him May 28, 1867, and described that year in the SCIENTIFIC AMERICAN. —ED. S. A.]

The Rose Garnet Rock of Morelas, Mexico.

Pliny, in his voluminous and discursive "Natural History," reaches in the 36th book the subject of building materials. In his omnivorous, predatory and unsystematic manner, he narrates what architectural wonders have been accomplished and descants with philosophic gravity upon the dangerous luxury which has been fostered by the discoveries of fair and attractive stones. In looking at the unique and attractive slabs of the rose garnet rock (rhodolite) exhibited at the Lincoln building, New York, under the direction of Mr. Niven and Mr. Atkinson, the visitor was struck with a feeling of curiosity as to what the appreciative Roman historian would have said at this singular and gay material. In a mottled matrix of yellow and white, sparsely dotted with irregular areolae of gray, appear blossoms of pink garnet. In certain lights and in examples of exceptional excellence, the novelty of the effect is certainly pleasing and surprising. Pliny would have rewarded it with his sedate praise, but the Roman voluptuaries, doubtless, would have adapted it in their domestic ornamentation, their veneered walls, their baths and tables, their tesselated pavements, and their columned porticoes. It would seem well suited for many ornamental purposes to-day. It varies somewhat in its brilliancy, but the different tints could be successfully separated and used in different connections and for different purposes. This interesting material is a strong, tough aggregate of wollastonite, vesuvianite, and garnets, the whole somewhat penetrated with silica and here and there holding limestone granules and crevices. The wollastonite, vesuvianite, and essonites (to which grade of garnet these may be assigned) are frequent associates in volcanic rocks, and we may confidently conclude that igneous action has assisted the development of this triple mineral alliance in this case also. It is a metamorphic result produced in a limestone region, assisted by the infiltration of silicious waters. The garnets afford evidence of growth where in the cut sections the polygonal rulings reveal their polyhedral accretion, and in places there are traces of subsequent alteration in crystallized calcite. The quarries are situated on a hill top about ten miles from Cuautla, in the state of Morelas, Mexico, and within sight of the snow-wrapped pinnacle of Popocatapetl.

This stone is in the neighborhood of heavy bodies of eruptive rock and the agency of heat has effected the development of these minerals under aqueous conditions which permitted the chemical and physical separation of these silicates. Two hundred and forty thousand tons of this rock are in sight, and the resources of the locality seem inexhaustible. The stone has been at last successfully treated so as to secure a polish, and we think used in connection with a green stone (serpentine, jade, nephrite, prase, malachite, etc.), as a border or frame, its beauty would be greatly enhanced, and that it would present upon walls or in mantel and table tops a very attractive appearance. It varies in quality and here, as in all other stones, selection is desirable. In columns the effect is cheerful and pretty, and in columns of considerable dimensions and some height, with a granite polish, we could imagine the effect excellent. It will naturally attract attention, and challenge the criticism and careful scrutiny of architects, decorators, and builders.

Exposition Items.

The lost and found department at the Exposition has collected a motley variety of curiosities. There have been an average of two hundred articles lost each day of the Exposition and only one-half of these have been returned. One would suppose that umbrellas would constitute a larger part of this collection, but women's handbags take the lead, and these bags contain almost everything, from a piece of chewing gum to rolls of bills and railroad tickets, but unfortunately no name or address by which the owner can be identified. Visitors have not neglected to leave umbrellas, as about two thousand still remain uncalled for. The number of wraps that have been found would supply a good sized second hand clothing establishment, and in variety of cut and cost of material they would give points to any clothing establishment in the country. Most of the wraps are women's wear, but men have not been any too careful in forgetting their overcoats. Quite a number of watches have been reported as lost, but the number reported found has been small. Many lunches have strayed away, which is a surprise, as one would naturally suppose that such a package would be closely watched. One of the first curiosities added to the collection was a clothes wringer. A little later a policeman lost his billy and a Columbian guard his sword. Evidently the guard was too much mortified to confess his loss, but as his number was on it, it was returned to him. The Woman's building has led all buildings in the number of lost articles and the Art Gallery has been a close second to it. Now that the Exposition is closed, this collection of articles will be classified and arranged and a full list published, so that people who have lost articles may have opportunity to reclaim them, but unless this is done within a certain time, an auction room will take possession of everything.

An exhibit in the Educational Department that attracted a great deal of attention from teachers is the method of teaching mathematics as exploited in the Washington public school at Hackensack, N. J., by Professor Nelson Haas. The general principles of this system were shown in the New Jersey educational exhibit, the foundation idea being to combine the abstract with the concrete, so that the pupil can comprehend in a practical way what he is trying to do. In the primary grades, where children from six to eight years old are taught the rudiments of mathematics, each problem is illustrated by drawing and frequently coloring the articles referred to. Thus in addition or subtraction, if certain quantities of apples are to be added or subtracted, the pupil draws the number of apples represented, so that he has before his eyes a practical demonstration of the problem. In the more advanced grades the pupils are asked to find how many yards of carpeting of certain widths would be required to cover a floor, or how much plastering to cover the walls of a room, and similar practical problems. In each case the room or other subject of the problem is outlined in a drawing, so as to put before the eyes of the pupil a natural demonstration of what is wanted. This system has proved so efficient that the cadetships in this district of New Jersey for both Annapolis and West Point are taken by students who were educated under this system. The same principles are carried out in higher mathematics on a similar plan, so that pupils from fourteen to eighteen years of age seem to have a clear comprehension of problems in algebra, trigonometry and even differential calculus. In this same section there was shown a system of teaching music by means of picture scales that attracted a great deal of attention from educators.

Every visitor at the Exposition heard a great deal about "fakes" in Midway Plaisance and no doubt encountered several of them, but one deception has just come to light which will disappoint many people. Probably no character in the Midway was talked about more than "Far Away Moses," who was connected with the Constantinople bazar. This individual was made famous by Mark Twain, and nearly every American who has visited Constantinople since Mark Twain's memorable visit has made use of this guide. When the Constantinople bazar was opened it was heralded broadcast that "Far Away Moses" was on hand to receive his old friends and patrons, and scores of these people have hunted him up. Since the Exposition has closed it has been discovered that the original "Far Away Moses" died some three years ago and that this counterpart is an individual resembling him, who was brought to Chicago because of the trade he might draw because of his name.

A photograph that was shown in the English section of the Exposition of a pile of 20,000 billiard balls told a surprising story of the slaughter of elephants to provide ivory for this one purpose. An average of ten balls is made from a pair of tusks; thus this pile of balls represented a slaughter of 2,000 elephants for this purpose alone.

Death Rate of Large Cities.

Statistics are given below compiled for the first half of this year by Secretary Carter, of the Maryland Board of Health, showing the mortality in various cities of this country and Europe having a population of more than 100,000, and they will be found of considerable interest. They are as follows:

	Population.	Deaths.	Death rate per 1,000.
London	5,849,104	55,895	19·11
Paris	2,424,705	28,675	23·61
New York	1,801,739	23,856	26·47
Berlin	1,669,124	17,181	20·58
Chicago	1,458,000	13,590	18·95
Vienna	1,435,931	18,005	25·07
Philadelphia	1,115,562	12,249	21·95
Brooklyn	978,394	10,682	21·84
St. Louis	520,000	4,802	18·47
Brussels	488.188	4,359	17·86
Boston	487,397	5,816	23·88
Baltimore	455,427	4,806	21·10
Dublin	349,594	4,735	27·05
San Francisco	330,000	3,006	18·21
Cincinnati	305,000	3,000	19·67
Cleveland	290,000	2,538	18·19
Buffalo	220,000	2,361	16·28
Pittsburg	255,000	2,923	22·92
New Orleans	254,000	3,598	28·72
Edinburgh	267,000	2,572	19·22
Milwaukee	250,000	2,000	16·00
Louisville	227,000	1,630	14·80
Minneapolis	209,000	1,004	9·60
St. Paul	155,000	745	9·61
Christiania, Norway	156,500	1,385	17·75
Denver, Colo.	150,000	871	11·61
Rochester, N. Y.	144,834	1,291	17·87
Reims, France	105,408	1,503	28·62

Gigantic Electrical Machines for Niagara.

The Cataract Construction Company has recently awarded to the Westinghouse Electric and Manufacturing Company the contract for building the immense generators, etc., for the transmission plant at the Falls.

The machines are to be built from designs prepared by Messrs. Coleman Sellers and George Forbes, the engineers of the Cataract Company, and will be many times larger, *Electricity* says, than any that have been built heretofore.

The apparatus will be built in units of 5,000 horse power. The revolving field of the generators is to be constructed with inwardly projecting poles, and will revolve in a horizontal plane, being mounted upon the vertical shaft of the turbine. The contract covers three dynamos of 5,000 h. p. each.

The weight of the shaft, turbine and armature is to be carried by the upward pressure of the water columns producing the heads for the turbines. The electromotive force generated will be 2,000 to 2,400 volts, and will be increased by step-up transformers for long distance transmission and lowered by reducing transformers for distribution. The motors will be the two-phase Tesla motors, which have been found to be well adapted for power purposes. The system adapts itself readily to the use of motor generators or rotary transformers, so that it is possible to develop either single-phase alternating currents or continuous currents of any desired electromotive force as may be required for the uses of individual customers.

The chief officers of the Cataract Construction Company are: Edward D. Adams, president, Francis E. Stetson, Edward A. Wickes, Wm. B. Rankin and Dr. Coleman Sellers as engineer, with Prof. George Forbes, of London, as consulting engineer.