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SCIENTIFIC AMERICAN SUPPLEMENT

No. 682.

For the Week Ending January 26, 1889.

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AN ELECTRICAL COURSE AT COLUMBIA.

Columbia College, New York, has decided to have a special course in electrical science, and not a moment too soon, for this has long been seen to be a department by itself, and, while allied to other branches of natural philosophy, requiring, at least from those who would adopt it as a profession, an undivided attention. Because of this it is to be made a post-graduate course of one, two, or three years, thus allowing those who have completed the rudimentary studies in electricity and magnetism in the School of Mines, and outsiders with elemental experience, to continue their studies. The proposed course will consist in practical work, construction of lamps, dynamos, primary and secondary batteries, insulation and installation of the plant, and, of course, investigation of the phenomena of electricity.

There is that called "theory" and that called "practice," and while one may be had without the other, no man may justly consider himself an electrician who is not familiar with both. In all the large electrical shops, as in the engineering ones, experience has been had with men schooled only in the theory of their work, and though it is an invaluable capital to commence practical work with, it has not been found infallible in the making of a first rate workman, while in some shops they prefer a slight acquaintance with practical work, if the man is intelligent and industrious, to a deal of theory where the latter is allied with over-confidence. On the other hand, it is hard to find a shop-bred man, let him be ever so skillful, who does not sorely regret his lack of theoretical knowledge. Few such men can draught their own designs or make their own calculations; often witnessing phenomena while experimenting, or during the course of their labors, which, were they read in the natural laws, those that have been formulated, they could perhaps appreciate and reproduce.

A workshop, laboratory, and lecture room such as it is designed to place at the disposal of the electrical department of Columbia College, ought to be sufficient to turn out men capable of original investigation; men at least capable of taking a responsible position in the practical work in the mercantile field; who can design and work or superintend work from their own drawings. In a practical age like this, that would seem to be the most valuable college instruction which most nearly resembles what its recipients are looked to to accomplish outside of it.

A NOVEL EXPERIMENT WITH CRIMINALS.

The report of the Elmira Reformatory, now eight years in operation, will be found worthy the attention of the scholar, as well as that of the humanitarian. It shows, so far as so limited an experience can be relied on, that the contamination of a penitentiary tends to encourage those to adopt careers of crime who are not naturally vicious, and, *per contra*, that education and the absence of vicious surroundings serves, at least in the case of first offenders, to wean them from the course they have only just set out upon. It says that 60 per cent of the convicts released from other prisons find their way back again, while, thus far, 80 per cent of those discharged from the Elmira Reformatory, during the eight years of its existence, are believed to be permanently reformed and engaged in honest labors.

It must be remembered, while considering this statement, that only first offenders are admitted to the Reformatory, while into the ordinary State's prisons come the old criminals, from whom little or nothing can be hoped. But it has been set down as a rule: "Once a criminal, always a criminal," that those who have served one term in a penitentiary are likely to return; the prison authorities infer this where they do not say so in their reports, and the statistics they give seem to confirm the statement. At the Reformatory the system of discipline is wholly different. The terms of confinement, however long, may be remitted by the board of managers after one year's incarceration.

A regular system of instruction is maintained; the prisoners devoting themselves to studies which will the better enable them to be self-supporting; the fact that good behavior, attention, and industry will free them quickly, and that they have yet a chance to go on again without the stigma that always attaches to those serving a term in the penitentiary, encourages those with the least spark of intelligence; nor does intellectual development, as has been alleged, increase the capacity for wrong doing. At least the authorities of the Reformatory say they have not found this to be the case.

DANGEROUS FLAT HOUSES.

The London *Lancet* sees a menacing danger in the present system of living in large flats, save when unusual caution is observed in drainage inspection. It says that persons so living are at the mercy of the janitor, though to the lay mind it seems obvious that they would be still worse off without one. If he is ignorant or neglectful in the matter of the drain pipes, "the whole house may be rendered unhealthy." But if such should happen, the occupants would leave, the house get a bad name, and its owner lose money. Hence, happily, it is to the interest of the owner to employ an efficient janitor and to see that he attends to his duties.

The suggestion that those about to rent a flat should, as a preliminary, employ a physician to investigate its sanitary condition, has, of course, much to commend it, while, at the same time, a precaution that those of very moderate means, dwelling in the poorer, and, perhaps, for that reason, the most scantily protected flat houses, are not likely to take. So far as New York flat houses are concerned, the Board of Health reports them to be fairly well aired and drained, and has not, as yet, found reason because of any prevalent disease to discriminate between those above the rank of common tenements and the expensive "apartment" houses. The *Lancet* goes on to say: "If the main drain is not both water-tight and so disconnected with the sewer as to admit of a free current of fresh air through its entire length, we have no hesitation in asserting that the risk of living on the premises is a substantial one, and that it is increased by reason of the multiple occupation which always occurs in the case of flats."

A medical inspector of the New York Board of Health being shown this, said, substantially: "So far as New York flat houses are concerned, such private inspection as is here suggested is scarcely necessary. By the rules established by the Board, each apartment must be furnished with trap and siphonage of its own, and as each of these is connected with the main drain, any imperfection there is quickly noticeable throughout the house, and we are notified. As a rule, however, owners through their janitors take great care to correct troubles of this kind, at the earliest possible moment, it being to their interest to do so."

THE USE OF RADIATED HEAT.

Its scientific production and application is new, and interesting as the use promotes economy.

A demonstration of this has recently been made by James Henderson at McKeesport, Pa., where he erected a furnace for heating scrap iron by burning natural gas; in the construction of this furnace six 1-inch gas pipes are placed at one end, which deliver the gas into a large expansion chamber, the quantity being regulated by valves and a blast gauge. The gas expands greatly in the chamber and travels from the open end of this chamber to the air tuyeres, situated at the end of the gas passage, where a measured quantity of cold air is delivered to the gas, which has become highly heated in its passage to meet the air by the heat radiated by the burning of the preceding gas. The heat is probably 3,000° F. before it meets the air. The air is delivered diagonally forward across the gas flue, so that its focus is but 6 inches from the heating chamber. The gas passes through the air, and is so thoroughly mixed that the combustion is perfect by the time the flame, thus produced, enters the heating chamber, and there is no smoke anywhere; the chimney top presents the appearance of radiated heat observable out of doors on a hot day.

The bed or hearth in the heating chamber is 20 feet long, 4 feet 6 inches wide, and 5 feet from hearth to roof in the clear; the flame passes clearly above the iron on the hearth, and about one foot clear of the roof to the uptake. Iron charged simultaneously at each of the four doors of the furnace becomes as quickly heated at the uptake as where combustion takes place, or in five minutes 250 pounds at each door is at welding heat and ready to draw, so that five piles may be heated every five minutes, of 250 lb. each. By charging at each door consecutively, a pile may be drawn every minute, or 1,440, or 180 tons, in 24 hours. It is claimed for this furnace that if air be excluded from passing through the doors, except when drawing and charging the piles (which is not the case at McKeesport), nearly all of the waste of 10 per cent usual in heating iron may be saved. The economy of fuel is very great, as the production is from three-fourths of that now generally used for heating, with seven times greater output from the less quantity.

Wrought iron exposed on the hearth of this furnace in large lots begins to melt in ten minutes, becoming mushy or so soft that it cannot be balled except it is first cooled by throwing water upon it, indicating that the furnace will be economical for making open hearth steel—its cost not being over $3,000 to make it, with a bed to convert 20 tons per cast. There are no regenerators, nor is heated air used, nor is there any additional expense incurred in heating the gas. This furnace dispels the illusion that regenerators are essential to making high temperatures for steel making, and shows that steel may be made for about one-eighth the cost for furnace now incurred.

A small fan blower is placed in the gas pipe, where there is a possibility of a short supply of gas, to exhaust the gas from the wells, and at the same time measure the quantity used. The fan may be placed on the same shaft and be driven by the same pulley that drives the blower that supplies the air to burn it, thus automatically regulating the working of the furnace.