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(Illustrated articles are marked with an asterisk.)

WHAT SHALL BE DONE WITH THE MODELS AT THE PATENT OFFICE?

It is to be presumed, that, at the time the Patent Office Building was erected, and inventors were required to deposit, with their drawings, models of the devices for which they solicited patents, the steady growth and ultimate magnitude of the collection was not anticipated. A letter, published in another column, informs us that many of these models now lie about on the floors, there being no room to store them elsewhere. Others are piled on the tops of cabinets, and on each other, so that the original purpose of the collection is defeated, so far as the public is concerned, while it is difficult for the examiners to perform their duties. Many of the models are broken and thrown in heaps of promiscuous rubbish.

The head of the model department, who is represented to be very efficient, is doing all he can to bring order out of chaos; but it is painfully evident that there must, sooner or later, be a clearing out of useless and broken models. There are a great many that it is of no consequence whatever to keep. There are others so dilapidated that their inspection reveals nothing without the drawings, and the latter are sufficient to guide the examiners. The rubbish might as well be removed at once, and space made for the well preserved and important models. It is also certain that more room will be needed, if the present system is maintained; and this might well be supplied by buildings erected from the money, now in the Treasury Department, belonging to the Patent Office.

It will, however, be useless to expect that it will be possible to continuously supply space to store models. At the present rate of accumulation, to arrange and store them properly will require an addition equal to the present accommodation once in about seven years. What, then, shall be done with the models, is a question that must in some way be answered. We say, do without them; that is, do not attempt to preserve them in a public collection. It has been wisely suggested that, for purposes of general information, good perspective drawings, reproduced by photography and cheaply obtainable on application, would be far more efficient than a great central museum of models that not one in ten will ever visit, or, if they should, could ever find time to examine a tithe of its contents.

Of course, models would be needed to assist the examiners with probably about one fourth the applications made; these, after each case had been attended to, might be returned to the applicants. It is certainly folly to attempt their preservation in a collection. As the coral insect, particle after particle, builds islands of vast extent, so the constant accumulation of models will result in an enormous reef of ingenious contrivances, which will wreck the patience of any who attempt to explore it. Better at once abandon the attempt to preserve models, and only endeavor to keep the drawings and specifications. This is our view of the subject. If any one has anything better to suggest, we shall be glad to consider it.

DRYING BY COLD.

Most people have an idea that to dry anything rapidly requires the agency of artificial heat. This is a mistake. Chemists are cognizant of many methods of drying substances where heat, above the ordinary temperature, is not employed.

One of these consists in placing the substance to be dried in a close compartment, in which is also placed an open vessel containing strong sulphuric acid. Sulphuric acid has a strong affinity for water, and takes water from the air surrounding it. The air, which also has a strong affinity for water—though weaker than the acid—thus dried, takes moisture from the substance to be desiccated. This moisture is seized by the sulphuric acid, and so the air, acting as a conveyor, goes on taking water and giving it up to the acid till the desiccation is completed. In this way, substances may be dried that could never be made to yield their moisture under the action of heat in an ordinary atmosphere, or which would be injured by heating.

Moist gases may be dried by passing them through the interstices in a collection of fragments of chloride of calcium, quicklime, fused potassa, or soda, each of which has stronger affinity for water than gases have.

Whenever any substance has a greater attraction for water than the expansive force of heat can overcome, it cannot be dried by heat; and the converse is also true. In the process of evaporating a liquid in an open vessel, or in the desiccation of a solid in a common kiln or oven, the moisture driven off by the heat is seized upon and absorbed by the air. If the air has less water than it has capacity to hold in suspension, the water evaporated disappears from sight and assumes the condition of a transparent vapor intimately mingled with the gases of the atmosphere. If, however, the capacity of the air be satisfied, the moisture assumes the form of a cloud of fog or mist, or is even deposited in the form of rain, perhaps in the form of snow or hoar frost, if the temperature be sufficiently low.

The capacity of air to hold suspended water vapor increases as its temperature rises, and *vice versâ*, so that by heating it, it may be made to take from substances moisture which it will deposit on cooling, thus becoming a conveyor of moisture, as in the process mentioned above where sulphuric acid is employed.

We have seen the moisture so far extracted from air admitted into a chamber, the walls of which were surrounded by a refrigerating mixture, that the weight of the volume was considerably diminished.

By thus continually extracting its moisture through the agency of cold, air at low temperatures might be made the vehicle for rapidly desiccating many substances that heat would injure; and there is no doubt this principle might be applied to advantage in some industries. We have ourselves employed it with excellent results, in an experiment, using the same air over and over, as previously explained, and have thus satisfied ourselves of its utility in some delicate operations.

TO OUR READERS.

It is with pleasure that we inform our readers of the large and gratifying increase in the circulation of the SCIENTIFIC AMERICAN. During the single month of January, we received upwards of ten thousand new subscribers, and they are still pouring in upon us from all parts of the country.

This unparalleled increase has exhausted our large stock of back numbers, and of late we have been obliged to commence all subscriptions with the date of their receipt by us.

This is the best we can do under the circumstances; but if there is any considerable number of our subscribers to whom this arrangement is not satisfactory, and who really desire to receive the back numbers, we propose to have them reprinted.

To enable us to determine as to the propriety of thus reprinting, we respectfully request all persons who desire to receive the back numbers and have their subscriptions correspondently dated back, to inform us of the fact by mail without delay.

If any of our friends have any of the first five numbers of the present volume, for which they have no use, we should esteem it a favor if they will return them to this office, and we will add to their subscriptions accordingly.

THE EDUCATION OF THE DEAF AND DUMB.

In ancient times, the Hindoo pundits decreed that any one born deaf, or any one dumb from whatever cause, should be incapable of succeeding to property; though the same law arranged for the sustenance of the sufferers by making it a charge on the person who superseded them in the inheritance. It has been stated that, among the oldest nations of the East, the destruction of such children as useless burdens on society was connived at, if not authorized, by the governments. But instances of the care and sympathy of individuals for these poor creatures begin to occur after the advent of Christianity; and in the writings of the venerable Bede and elsewhere, we read of the partial success of attempts to teach the deaf and dumb to communicate by signs. The first noticeable attempt at a plan for this purpose is the publication, by a Benedictine monk named Bonet, of a treatise called "The Reduction of Letters and Arts for Teaching the Dumb to Speak." In this book, the author professes to have invented a system of finger talking or "dactylology;" and he published engravings of the one hand alphabet, now used nearly everywhere. The desirability of such means of communication subsequently caused many physicians and other scientists to bestow great attention and ingenuity on the subject; and, among many treatises publishing suggestions, one of the best was written in the year 1680, by one Dalgarno. He was a Scotchman by birth, and a school teacher in England; and his work, called "Didascalocophus, or the Deaf and Dumb Man's Tutor," even goes so far as to assert the superiority of written language and a finger alphabet over reading and talking by the organs of speech. Professor Porter republished this treatise in the year 1857, and states that it is "a work of such preëminent ability, and so replete with sound principles and important suggestions of practical value, that it ought to be familiarly known to every instructor." A German named Heinicke did good service to this cause by giving his time and attention to teaching a few deaf mute pupils; and his success was rewarded by the Sax on government inviting him, in 1772, to Leipsic, to superintend a school which is in existence and prosperity to this day Without, however, enumerating all the various advances made in this branch of education, by mingled science and philanthropy, we come to the labors of Americans in recent days.

In the year 1815, the deprivations of all the pleasures of life, which deafness and dumbness visited on a young lady of Hartford, Conn., interested some gentlemen of the same city in the subject; and they despatched a clergyman to England, to learn the system taught by some persons named Braidwood, who had met with much success and some celebrity. With a narrowmindedness strangely out of place in such a connection, these people declined to instruct the visitor except on terms at once exorbitant and burdensome; and the clergyman journeyed to France, accomplished his mission, and returned to the United States with M. Laurent Clerc, a well educated deaf mute, and one of the best teachers, on the system of Abbé Sicard in use in his country, then to be found. In 1817, the American asylum at Hartford was opened, the Rev. Mr. Gallaudet, the clergyman above mentioned, taking the post of principal, and M. Clerc that of assistant. From this small beginning, which, like many other noble and useful works, originated in the sense and liberality of a few private individuals, has grown up an extended system for the education and improvement of these unfortunates, whose claim to our wisest, best, and most strenuous efforts needs no recapitulation. A column might be filled with the names of deaf and dumb persons who have become valuable and useful members of society, some of whom have obtained eminence in art, science and literature.

But the greatest success in teaching those born deaf to speak has been recently attained, in the United States and in Germany, by the use of a system of lip talking. By this method, the language is communicated to the pupils solely by the motion of the speaker's lips; and such excellent results have followed the introduction of this method that, in an asylum at Northampton, Mass., general conversation is carried on with such rapidity and vivacity that it is at first difficult to induce a spectator to believe that the little pupils have been, many of them, stone deaf from their birth, and that the observation of the movements of the lips is the only opportunity for instruction that they have ever had. So thoroughly efficient is it that education is being carried on, through its means, up to the higher branches, many of the pupils being proficient in physiology, botany, and mental philosophy, as well as in drawing and other arts. Such results indicate the great superiority of the new system, and encourage us to hope that the terrible afflictions of deafness and dumbness may be soon deprived of their worst evils.

PRODUCTION OF STEAM IN BOILERS.

The economical and safe production of steam in iron boilers is, in this steam using age, a matter of primary importance; notwithstanding which, it is somewhat astonishing how little is generally known of the principles which must be observed to secure both safety and economy. The theories and speculations, indulged in by various authors in regard to the precise nature of the molecular motion produced in solid, liquid and gaseous bodies by the agency of heat, have—at least until they are subjected to experiment—no practical value. We must seek light alone from such facts as are demonstrated, and be guided solely by that light.

The only motion that takes place in heated water, with which the steam maker has to do, is that caused by the difference in the specific gravities of the molecules by unequal heating. The motion in steam which the steam user needs to comprehend is that caused by the mutual repulsion of the heated particles of water in a gaseous state.

When heat is first applied to water, the heated particles rise because their specific gravity is lessened. Other particles are in turn heated, and give place to others, and so successive strata of particles are heated over and over, till at last some of them arrive at the required temperature to expand into gas. In assuming this form, that portion of water so converted takes suddenly, under atmospheric pressure, a little more than four and one half times as much heat as it previously had, which heat disappears as temperature or sensible heat, and, becoming latent, imparts its expansive energy to the steam, a small part of which energy is subsequently converted into work in the engine to which the steam is supplied. In thus suddenly absorbing so much heat, it as suddenly expands to a much greater volume than it previously occupied, causing upheaval of the superstratum of fluid; and, rising to the top, it escapes with such rapidity as to cause bubbling, a state of things we call ebullition or boiling.

Now in the construction of steam boilers, we have to consider only these simple and elementary facts, with such modifications as arise from pressures above that of the atmosphere, and the expansion of metals by heat, and we must provide that the movements which take place naturally in steam generation shall not be artificially interfered with. Neglecting these provisions, we fail in economy, and increase the danger of steam production. The water must have free circulation and the steam must have ample avenues of escape from the liquid. Then if the boiler can withstand safely a given pressure and the strains caused by unequal expansion, and if the steam finds a ready escape from the boiler before that limit of pressure is reached, we have, so far as the boiler proper is concerned, the required conditions for economy and safety.

But to generate steam we must generate heat, and here the element of economy is the one most important to be considered. To get the greatest available amount of heat from