IMPORTANT HINTS ON VENTILATION

BY E. M. RICHARDS, C.E.

[Written expressly for the Scientific American.]

[Concluded from page 395.]

In sailing ships, the "galley" or cooking fire is the agent by which the heated air should be assisted in its endeavors to escape from the cabins and sleeping berths. A wholesome sea-breeze should be allowed to enter in its place, through pipes connected with funnels on deck, which should be always placed "head to wind." The furnaces of steamers offer an abundant supply of power for ventilation, yet it is all allowed to go to waste, as far as the health of the passengers and crew is concerned; they seem to be not one whit in advance of their sailing brethren in this respect.

The ventilation of railroad cars offers some peculiarities, not to be found in that of houses and ships, arising partly from their crowded state (more persons often being found packed together in a car than in any other apartment of the same size), the rapid motion and the fact of having dust to combat as well as foul air. In this case the plan to be adopted differs from that before-described, inasmuch as the upcasts are unconnected with any fire for the purpose of drawing out the impurities of the atmosphere of the car, and the fresh air, instead of merely being *allowed* to enter through its conduits, is *forced* in by the flight of the train. Systems that depend on the driving of wheels, fans, belts, &c., and that require much supervision, have not, as a general thing, been very successful. To secure its introduction, a method must be somewhat self-acting; people are not yet sufficiently alive to the importance of the subject to trouble themselves about a plan that must be constantly looked after. As far as is known to the writer, the system to be explained below has not hitherto been tried; but the general principles, of course, have long been common property. There is no new fact brought forward; nothing is claimed for it, except that it involves a combination that gives a reasonable prospect of success in practice. As no opportunity for testing the matter by actual experiment has ever been offered, no attempt at accuracy of detail will be made; the general idea alone will be sought to be eliminated. At any rate, it will be freely given for what it is worth; and it is hoped that some railroad superintendent will give it a *fair* trial, and make known the result through the columns of the SCIENTIFIC AMERICAN. Should it fail, the publication of the fact will save others from fruitless endeavors in the same direction, and trial must be made elsewhere to secure the desired results; but if it is successful, or points out the way to subsequent improvers, it will be a great satisfaction to the writer to know that he has done something towards securing a healthful and pleasant atmosphere in our passenger trains, instead of the pestilential air now too frequently to be found therein. The system is as follows:—

The upcasts ought to be ample in size and number, and situated as usual along the center line of the car. The roof should have a high camber or rise, should be smooth and quite free from sunken panels or moldings of any kind; everything that can offer any mechanical obstruction to the upward passage of the heated gases should be avoided. In general, the upcasts (where they do exist, but on several railroads, even now-a-days, there are none) are too small, and they are badly constructed, having a metal molding round the line of junction with the roof. This is objectionable; for, in addition to being an obstacle to the ready entrance of the foul air into the bottom of the vent, it has a tendency to cool the ascending particles, which effect was before shown to be a hindrance to perfect draft. The external portion of the vent or upcast ought to be in the shape of a swiveling cowl, so constructed as to present its mouth always towards the rear end of the car when in motion. The mouth of the cowl should be surrounded by a broad circular flange or web, the object of which is to increase the surface of the tube, so that, by the rapid motion of the car through the air, it may cause a greater rarifaction behind it (just as moving a flat-board quickly with its broadside foremost, causes a slight vacuity in its rear) than the plain tube would have done. This rarifaction helps to draw the heated gas from the interior of the car; and the greater it is, the more thoroughly will it effect its purpose. The outside of the cowl ought to be painted a dull black, for this increases its heat in the sunshine. In the winter the color is of no consequence.

The fresh air is to be obtained thus:—On the outside of the roof, at corners diagonally opposite to each other, are to be two wide-mouthed "air-catchers"—one to supply each side of the car, and to be placed as near the side as practicable. These air-catchers resemble the cowls for the foul vents; being, like them, swiveling, but they differ from the vents by being arranged so as always to present their open mouths in the same direction in which the train is moving. Across these mouths are to be stretched fine wire gauze screens. Each air-catcher is to be connected with a large tube or main pipe leading down towards the interior of the car. Just inside the roof, and in a situation where water will never freeze when the car is in use, this pipe enters a small tank or cistern containing water, beneath the surface of which the end of the pipe dips to a short distance. From the upper part of this cistern another similar tube leads *up* for a very short distance, and then turns directly downwards towards the floor. At about the same level as the under side of the seats, this main inlet pipe is to run horizontally along next the side of the car for its full length. The small service or supply pipes are to branch out from this main at right angles to it, and run along the under side of the seats, terminating at or near the central passage of the car. The ends of the service pipes are to be so arranged as to prevent them from discharging an unpleasant stream of air on the legs of the occupants of the seat on the opposite side of the passage towards which they point. Each supply or service pipe is to be furnished with a stop-cock to regulate the amount of air passed in by it.

From the foregoing details it will be seen that, when the train is in motion, these air-catchers, with their large bell-shaped mouths made open towards the front, will pass down great quantities of air in proportion to their size and the velocity of the cars. The coarser particles of dust, cinders, &c., are at once arrested by the gauze spread across their mouths; and the air, thus somewhat freed from its mechanical impurities, runs rapidly down the tube connecting the air-catcher with the cistern; the end of this tube being a little under the surface of the water; and the current of air, in a vast number of bubbles, leaving all the fine dust that passed the gauze screen in the water, rises to the top of the cistern, where it enters the main tube that leads down to the service pipes; along this tube it passes, and in its course fills each service pipe under the seats, and is finally discharged into the car through their orifices at the proper level (between the floor and the mouths of the air-catchers), and rising up, supplies an abundance of pure air, free from dust, to the occupants The defective practice of admitting air either through the floor or over the heads of the passengers is thus avoided. In summer, ice may be put into the mouths (properly fitted to receive it) of the air-catchers and ice-water into the cistern, which will do much towards cooling the air before admitting it into the cars. In winter the stove pipes should be passed through the cisterns, so as to keep the water hot, and the inlet pipes near the cisterns to be cased in smoke-jackets to warm the incoming current. Most systems of car ventilation are intended for summer use, the prime object being to cool the carriage and abate the dust nuisance; while, as before stated, it is really in winter that the most injury to health is done by bad air: and for that reason, therefore, a scientific system of ventilation is most needed. The above described method is just as applicable (with the proper modifications) to one time of the year as the other.

The usual way of warming cars is very defective; the heat from them is only appreciably felt by those in their immediate vicinity, and even here they principally heat only the upper portions of the car; and thus, while they draw the external cold air through the floor, they keep the feet cold and the head hot, the very reverse of what it should be both for health and comfort. It has been proposed to have the cars heated by tubes containing hot air, hot water or steam, generated in some other part of the train—the baggage car or engine, for instance. There is this objection to all such projects, that they would be more or less inconvenient when coupling or uncoupling the cars. It would perhaps be better to try to effect the desired result by stoves in the cars, as now, only differently arranged. The following plan is submitted for consideration:—

Two stoves are to be placed in each car, one for each side, and located diagonally opposite each other, in the same way as the air-catchers before described. The pipes from these stoves, instead of passing directly out of the roof, burning the fuel with an upward draft (as at present done), should lead *downwards*, and run horizontally along the floor to the other end of the car, about perpendicularly under the middle of each seat; this horizontal pipe or flue should be made of pipe tile or other imperfect conductor of heat, and should be laid so as not to injure the floor and inconvenience the passengers; after having reached the opposite end, it should rise perpendicularly and pass out through the roof, where it would be connected with the cisterns and fresh air mains (in cold weather), as before mentioned. Some such plan as this would apply the heat where it always should be—at the lowest point; then its action, being ascending, would warm the whole car much more evenly than at present; above all, it would keep those vulnerable parts, the feet, protected against their greatest enemy, the cold.

In conclusion, should any reader of the SCIENTIFIC AMERICAN desire more information on the subjects discussed in the foregoing series of articles, he is referred to an excellent and cheap little work, entitled "Warming and Ventilation," in Weale's (London) "Rudimentary Series for Beginners," which is better adapted to non-professional persons than some of the larger and more pretending volumes.

A HOUSEKEEPER'S HINTS TO INVENTORS.

MESSRS. EDITORS:—I have been a regular reader of that excellent paper, the SCIENTIFIC AMERICAN, for the last five years; and my judgment corroborates the assertion of many of my male acquaintances engaged in mechanical pursuits, that no other journal published in this country, or perhaps even in the whole world, so constantly, faithfully and vividly records the onward and rapid march of *mind*, and the daily extension of its influence over matter, in the fields of art, science and general literature. It is the only paper which devotes all its energies to the promotion of the best interests of the mechanic and the inventor, and which, dispelling the clouds of doubt and anxiety that often vail the eyes and oppress the hearts of many men and women of genius, throws widely open the portals of the vast halls of discovery, and exhibits, in the far-off but brilliant vista of the future, a destiny more glorious than that which ever was appointed to the greatest monarchs—the admiration, honor and blessing which is invariably given by posterity to those who, during their lifetime, justly earned, by the ingenious embodiment of such of their intellectual creations as were practically useful, the proud title of benefactors of mankind.

Desiring to make the contents of this letter sufficiently interesting to warrant its publication in your journal, I will, without further preface, propose two questions that are of immense importance to every individual of my own sex. If barbarous nations, owing to their ignorance, are incapable of self-government, does not the same argument apply to *woman* in all past ages? Now, however, when woman is beginning to aspire to the enjoyment of the benefits of citizenship and all other "rights" at present possessed solely by the "lords of creation," should she not also aspire to a knowledge of the *arts*, particularly of such as directly concern her domestic duties? In the Shop, where intelligent men daily labor, desirable improvements are readily seen, and applied to the different tools and implements they use; but in the House, few intelligent men come directly into contact with the various implements of housekeeping. Hence, while we have to acknowledge the recent invention of several desirable improvements in some branches of housekeeping machinery, there is still a large field open for the ingenuity of intelligent women. Permit a woman, therefore, to present to practical artisans among both sexes, throughout the length and breadth of the land, in the columns of their special organ, the SCIENTIFIC AMERICAN, a few thoughts in this department of invention, which arise out of the writer's own experience in housekeeping; and if, in doing so, I violate the laws of the science of mechanics, I trust that my natural want of a practical education in the arts will be accepted as an apology for any blunder that I may make. But if, on the other hand, I suggest some real improvements, I shall hope to be gratefully remembered by those ingenious mechanics who may derive profit from the reproduction of my ideas in a practical and patentable form.

The *kitchen stove*, which has more to do with the comfort of the house than any other article of furniture, has already been the subject of many useful improvements; yet there seems to me that there are two things in which it can be still further improved. The first is, making the openings on the top of the stove large enough to admit kettles with smooth, rounded bottoms (without any jogs), like those hung from cranes over kitchen fires, before the kitchen stove was invented. The sides of the kettle might be more perpendicular, but if we would have no burned dishes sent to the table, there should be no jogs or corners. Kettles simply for boiling water are well enough. But let us have at least *one* place in which we can set cooking kettles with thick, rounded, smooth bottoms, even at the expense of less openings or more surface. If the raised work on stoves is placed thereon simply for ornament, without reference to radiation of heat, I would have it dispensed with altogether. A plain stove would be much more easily kept clean, and this partly applies to parlor stoves also.

We require some apparatus for *airing beds*—an apparatus which shall elevate and separate each article of bedding, including the upper tick, so that the air may pass freely between each, when the windows and doors of the bedroom are opened to admit a fresh current of air; and which, when removed, should leave the bedding as before. If every bedroom had a balcony and glass folding-doors broad enough to permit the bed to be wheeled out into the air, this would be an additional improvement conducive to the preservation of health and life.

Again: there is great need of an apparatus for *washing dishes*, provided with a drainer so fitted that the plates, saucers, cups and bowls, may be taken from the table in piles, and laid on their sides in the drainer; each article being separated by a slat from the next, and hot suds and rinsing water being dashed upon them by machinery, leaving them to quickly drain themselves dry enough for future use.

If the foregoing suggestions should meet with favor, I may find time, at an early future period, to enumerate some other wants in the housekeeping machinery, equally deserving the notice of your readers.

MRS. VARNEY.

San Francisco, Cal., Dec. 1, 1859.

THE CONSTRUCTION OF STEAMSHIPS

MESSRS. EDITORS:—Under this head, your correspondent "Nauticus" (on page 362, this volume, of the SCIENTIFIC AMERICAN) says:—"Steamers must be built so as to secure great buoyancy, in order that they may not load too deep or light up to fast by the consumption of fuel and stores." He should have added, and reduce the resistence of a given cross section of immersion. The difference in pressure of the fluid to be moved at different depths, seems to be generally lost sight of. It being for the first 14 feet, only a mean of about 3.50 lbs. per square inch, while the mean pressure for the next seven-feet is about 8.75 lbs., and still the next seven feet it becomes about 12·25 lbs. per square inch. To overcome this power as the cube of the velocity sufficiently explains the reason of the *Great Eastern's* failure to meet the expectation of her proprietors; and why the Lake Erie steamers perform so well. Having spent much of the early part of my life upon the Atlantic, and leaving there with the prejudice common to all ocean taught men—the idea that nothing new could be learned upon the lakes; I soon found my mistake and set about improvement to meet the requirements of the then rapidly increasing business above the flats of Lake St. Clair. With this in view, I projected the first center-board vessel ever built upon Lake Erie or the lakes above, although I believe some small vessels had slip keels: her prow was long with very little dead rise, and ends quite sharp for the times; she was so far out of the ordinary line of model as to cause much remark, and the most experienced builder then in the West, asserted that he would not have such a vessel built in his yard, fearing his reputation would be injured thereby. But when the vessel was afloat, she told her own story, "by showing her heels" to all others; while she was carrying, relatively, a much larger cargo. From this vessel followed the immense tunnage of similar ones, comprising the great fleet of the lakes; some of which vessels have attracted considerable attention by their short passages across the Atlantic, and generally by showing superior sailing qualities when in company with sea-going vessels of different classes. These vessels when properly fastened, and not over sparred, are as safe for ocean service as any vessel can be.

Steamers were similarly built as to model one at a time when there were no harbors on the lakes. I was the first to take the charge of one to make trips regularly through the entire season to the upper lakes. She was then the largest steamer in America, but would appear small now; yet small as she was, she had to "bang out all weather," and she did this most successfully, and lived to die of old age.

The present fleet steamers of Lake Erie have similar floors with elongated ends and fine wave lines; hardly disturbing the water as they move through it. To give strength to their sides, instead of building them deep, and adding much unnecessary weight to be carried, arches of wood and truss work of iron are so disposed as to give great strength of "back bone" to a shoal vessel with little weight. If New Yorkers would stand in relation to ocean steamers, as they have done, and do now, in the fleetness of their sailing ships, let them discard their prejudice, look at facts, get a Buffalonian to build them a steamer, and they will soon follow with others, and be able to say "Come on, Cunarders! we don't want any Government subsidy." B.

Chicago, Dec. 14, 1859.

A WESTERN WONDER.

MESSRS. EDITORS:—In No. 23, "new series" of the SCIENTIFIC AMERICAN, I notice, under the caption of "A Remarkable Fact," an incident related by Professor Mitchell, of a gentleman in St. Louis of great scientific attainments. I venture to say that the gentleman referred to is Professor G. Seyffarth, A. A. M., Th. D.; and this caused me to reflect and wonder why it is that Professor S. is not more generally known. It is astonishing how many scientific men of very small caliber become known and exalted by the populace; while a man of no pretensions, with a modesty that can hardly be equaled, like Professor Seyffarth, is left unknown to the world until his ashes can hardly be found, when, lo! his fame spreads abroad, and becomes brighter from generation to generation, and the world is astonished that such a mind was not valued in the time of its earthly existence. Professor Dr. Seyffarth is doubtless well-known by the scientific men of the world, but not popularly; yet his researches in chronology have never been equaled by any mortal being, and are more valuable than all the gold found in California.

C. G. M.

Fort Wayne, Ind., Dec. 13, 1859.

NEW IDEAS ON AIR NAVIGATION.

MESSRS. EDITORS:—Under the above title you recently gave Dr. P. Reis' notion of "navigating a vessel in the air, independent of balloons, on the vacuum principle. This is a new idea founded upon an old error. The amount of force procured by Professor Magnus' method is just equal to the amount of force given by his fan-blowers. When air is blown through a tube it drives away the air before it, and this causes an inflow of surrounding air, which, coming from all sides, meets in front of the tube, forming there a cone of air, moving off in a straight line before the tube, and thus causing a partial vacuum inside the air cone, similar to that in the upmoving current in a thunder gust. The same phenomenon takes place in smoke-stacks. The smoke-stack depends for its draft upon the motion of the air over its outlet or top. This may be the result of a natural current over the stack, or by blowers. A current of air passing unobstructed by surrounding obstacles over the top of a smoke-stack, always induces a strong draft in the flue, whether the wind be north, south or west; but the fire does not burn as well with a south wind as with the others, because it throws into the fire more humidity and less oxygen than the others. I have only noticed the above dissemination of a "new idea" because the deductions imply the discovery of a law in nature to navigate a vessel in the air that is greater than the power used to induce the vacuum. The idea itself is an interesting one; it pertains to all manner of ventilation and currents, and is deserving of much thought, for it will explain various anomalies in flue drafts, water currents and air currents; but it will not serve the purpose of driving a vessel through the air, any more than the same amount of force applied to wings or flappers acting on the body of the air.

JOHN WISE.

Lancaster, Pa., Dec. 12, 1859.

CHEMISTRY OF TANNING.

MESSRS. EDITORS:—While reading an article on tanning (on page 384, present volume of the SCIENTIFIC AMERICAN), it appeared to me that the opinion expressed regarding the operation being purely chemical might be strengthened by an observation of the curious effect produced by electricity upon hides while in the "bait." If, during this part of the process, a thunder-storm occurs, the leather produced is invariably inferior in quality. The nature of the injury thus received is such that no eye can detect it; but when made up and put to use, the leather appears to want tenacity, and "gives out" prematurely. I will not undertake to say *how* the deterioration is produced; but it seems to me that if, while the hides and tannin are in process of combination, the simple presence of electricity in the surrounding atmosphere is capable of affecting the resultant product so seriously, the operation thus interfered with must be chemical and not mechanical.

A. F. O.

Albany, N. Y., Dec. 19, 1859.

GLASS-DRILLING.

MESSRS. EDITORS:—In reference to some receipts for drilling glass, recently published in the SCIENTIFIC AMERICAN, I would state that I take a common drill, harden and use it without drawing the temper, and keep the point wet with water. I have thus drilled a half-inch hole through glass one inch thick. It is more difficult to drill through window glass than that which is thicker. As regards another subject often brought before the notice of your readers, I would remark that water-wheels and machinery have the appearance of going faster when all is still around, or when it is so dark that no other objects are seen in motion. A steamer has the appearance of going faster on the river than when going at the same speed on the ocean.

L. W.

Waterbury, Conn., Dec. 12, 1859.

RAIN AND PAINT PHENOMENA.

MESSRS. EDITORS:—In No. 23, of the present volume of the SCIENTIFIC AMERICAN, is an article bearing the above caption; and I think the phenomena may be readily accounted for. The oil which had been used in the painting of the houses was probably rancid; and having an affinity for the carbonic acid in the atmosphere generated from decaying vegetable matter, resulting from the destruction at this time of year, of foliage &c. From the rapid corrosion in this case by oxygen in the oil assisted by carbonic acid, it is not to be wondered at that the paint changed to the seer and yellow ray. The drabs or neutrals are especially subject to weather stains.

The rain storm from north-east, which again changed the color held in solution chloride of sodium, from oceanic evaporation, necessarily re-bleached the paint.

New York, Dec. 19, 1859. E. F. B

THE CENTRAL PARK.—The Paris correspondent of the New York *Evening Post* writes that Mr. Olmstead, Superintendent of the Central Park, has been in that city for a few days on official business. He visited the Bois de Boulogne several times, and through the politeness of Mr. Phalen, had opportunities of studying it to every advantage. I think I may venture to say that he left in no respect discouraged by anything he saw or heard. He found the Central Park had many advantages which neither nature nor art had conferred upon the famous Parisian drive, while in respect to the improvements the New York work will, in many very important respects, bear a favorable comparison with any park upon the Continent. The roads of the Central Park are wider than the widest of the Bois de Boulogne, and they will be out of sight except when not immediately under foot; whereas in the Bois the eye is frequently offended with long white streaks of road, cutting up the distant lawn and destroying all the illusions so essential to broad landscape gardening. Then the Bois is not underdrained; the soil is very thin, the trees are not only for the most part of small size, but they are not thrifty, and never can be very handsome. In all these respects the Central Park has greatly the advantage. Mr. Olmstead left Paris with Mr. Parsons, of Flushing, L. I., to visit some nurseries and to make some purchases, of which the Park will bear abundant testimony another summer