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For the Week Ending January 9, 1892.

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ROOM STILL FOR THE TROLLEY.

Reports that a novel and practical system of electrical railway, invented by Mr. Edison, and alleged to be superior to all others, was about to be introduced have caused much annoyance to the promoters of the trolley system; many street railway companies ripe for a change to the trolley countermanding their orders and postponing their plans, and town and village authorities declining to sanction changes from horse to trolley till the value of the new system could be ascertained.

With commendable diligence Mr. Edison has described for public information the field which he proposes to cover. He has authorized the statement that the new system is designed exclusively for roads of heavy traffic, in large cities, where the expense of the original installation is warranted by the traffic, and where the trolley system will not be permitted. "The new system," the statement continues, "will not be applicable, in a commercial sense, to long roads operating less than fifty cars simultaneously. It must, therefore, be understood that, outside of the large cities, the best system that can be advocated is the trolley."

This statement will doubtless give much relief to the trolley people, not, however, because of fears on their part that he would supplant their system with something better, for it cannot be said, once apprised of his proposed method of application, they entertained such fears, but the admission on such high authority that a portion, indeed, it may be said the major portion, of the street railway field, notably that pertaining to interurban traffic, is yet within the legitimate domain of the overhead trolley motor, is calculated to remove aldermanic doubts and loosen and render street railway managers again complacent.

WOODEN SHOES AND CLOGS.

There is a considerable demand for wooden shoes in this country, especially in the Western States and Territories. They are worn by those who have become accustomed to the use of that kind of foot covering in the land of their birth and have not yet adopted the shoes generally worn here, and they are also used by persons who are employed in damp, sloppy places. Workers in tanneries, dyeing establishments and chemical works find them a better protection for the feet and more comfortable than shoes made of leather or india rubber. They are also worn by women when doing their scrubbing, and also on wash days.

The largest manufactory of wooden shoes in the United States is located at Grand Rapids, Michigan, and there are two similar establishments in the same city.

The products of these factories are shipped to nearly every State in the Union and to various points along the Pacific coast. The shoes are made from basswood logs sawed into suitable pieces for the various sizes. These blocks then undergo the process of shaping; the tool used being a very sharp, short-handled carpenter's ax. They are then brought under a trimming tool fastened into a block not unlike a butcher's block. The last-named tool, or knife, is about two to three feet long and shaped like a cooper's paring knife. Some workmen acquire a great deal of skill in manipulating the shoes, and the process of manufacture attracts visitors. After being properly shaped, the shoes are fastened for boring the cavity, which is done with odd-shaped tools, very sharp, and which are imported from the Netherlands especially for this purpose. These tools can only be handled successfully by the most skilled workmen. After shaping and boring the shoes are rubbed with sandpaper and in some instances polished. Some wooden shoes are made to order in most elaborate style, being engraved or painted and made very light in weight.

A good workman is able to produce from ten to twelve pairs of the ordinary shoes per day, and the principal factory at Grand Rapids has made between ten and twelve thousand pairs during the past year. Wooden shoes are not packed in boxes for shipment, like those made of leather, but, after joining them in pairs with twine, they are strung on sticks, a dozen pairs together, each lot bearing a tag with the name of the person to whom they are consigned.

The wholesale price for the ordinary shoes is $3 per dozen pairs, while the small sizes vary from 15 to 20 cents per pair, and there is also a common grade of toy shoes which sells at the last named price.

Clogs are made at a number of places in this country. One family in Philadelphia, five in number, including boys and girls, are expert makers of these articles. Clogs, which are known also as pattens, are wooden soles to which shoe or boot uppers are attached. In the midland counties of England large quantities of them are produced. There the sole and heel are made of one piece from a block of maple or ash which is two inches thick and a little longer and broader than the desired size of shoe. The outer side of the sole and heel is fashioned with a long chisel-edged implement called the clogger's knife or stock.

With another instrument a groove is made about one-eighth of an inch deep and wide around the side of the sole, and by means of still another tool, called a hollower, the contour of the inner face of the sole is adapted to the shape of the boot. The uppers of heavy leather, machine sewed or riveted, are fitted closely to the groove around the sole, and a thin piece of leather binding is nailed all round the edges, the nails being placed very close in order to give a firm, durable fastening. These clogs are also worn by people whose calling brings them into damp places.

Expensively made clogs are in demand. These have finely trimmed soles and fancy uppers, while there are clogs used by dancers on the stage which cost from $2.50 to $6 a pair.

The towns of Mende and Villeport are centers of wooden shoe manufacturing in France, and here about 1,700 people find employment in this industry.

Liquid Oxygen is Magnetic.

Professor Dewar has lately made a highly interesting communication to the Royal Society. Faraday, more than forty years ago, proved that oxygen alone among known gases is magnetic, and Professor Dewar sought to determine what effect a temperature of 180 degrees C. below zero would have upon its behavior in the magnetic field. Having previously ascertained that liquid oxygen does moisten or adhere to rock crystal, and consequently maintains in contact with that substance a perfect spheroidal condition, he poured the liquefied gas into a shallow saucer of rock crystal, and placed it between the poles of a powerful electro-magnet. He expected some such result as the total or partial arrest, under magnetic stress, of the violent agitation caused by ebullition of the spheroidal mass. But on the magnet being excited, the whole mass of liquid oxygen was literally lifted through the air and remained adherent to the poles until dissipated by the heat of the metal. The feeble magnetism of oxygen at ordinary temperatures had become a force to which no solution of a magnetic metal offers any parallel. Thus was strikingly and beautifully exemplified the relation between magnetism and heat, of which the entire loss of magnetic qualities suffered by iron at a red heat is a familiar illustration. The experiment, interesting and suggestive in itself, derives an added interest from the fact that the electro-magnet employed is the historic instrument with which Faraday carried out many of his classic investigations.

A New Power Wanted.

A writer in the *Sewing Machine News* is not satisfied with steam or the more recently adopted electric power, and wants somebody to invent something better. It will be done. The atmosphere is full of electricity, and, when overcharged, relieves itself in thunderstorms, and as these storms occur in hot weather, it would go far to prove that heat is at the bottom of it, and, if such be the case, why could we not devise some plan to produce and concentrate it at once by the use of gas or coal oil? That lightning has an affinity for coal oil is shown by the number of times large tanks are destroyed by it. The man that can devise some means for operating a motor cheaply that can be used in both city and country, can take his ease for the balance of his life. It would be well if some genius would turn his attention to something outside of the beaten paths of steam and electricity, and see if, in looking for one object, he is not overlooking another equally good.

Since air is the motive power that keeps so many animate machines in motion, why should it not be brought in use to move inanimate ones? We know that air presses a ton's weight upon every foot of exposed surface. Now, if we could, by some means, mechanical or otherwise, exhaust that air from one end of a cylinder having a square foot of exposure, we should have a ton's pressure upon anything filling the cylinder, which would force it to the end, and if this could be repeated at the other end, we should have the action of the piston of the steam engine reproduced.

Since the first steam engine owed all its efficacy to atmospheric pressure, would it not be well to see if the same means cannot be devised to utilize air, not in a compressed form, but by exhaustion at one end of the cylinder or in some other manner? If this could be done, either mechanically or otherwise, it would displace all other modes of transmitting power and could be used as well on the desert as in the city.

In the rush after electric motors, let us not lose sight of the fact that electricity is only one of the many physical forces by which we are surrounded, and that all such forces must be artificially excited.

Remedy for Whooping Cough.

Common thyme, which was recommended in whooping cough three or four years ago by Dr. S. B. Johnson, is regarded by Dr. Neovius (*The Lancet*, May 9, 1891), as almost worthy the title of a specific, which, if given early and constantly, invariably cuts short the disease in a fortnight, the symptoms generally vanishing in two or three days. He gives from one ounce and a half to six ounces per diem, combined with a little marshmallow sirup. He never saw any undesirable effect produced, except slight diarrhœa. It is important that the drug should be used quite fresh.

The Protection of Residences from Bacteria.

BY FREDERICK BAUMANN, IN THE "BUILDING WORLD."

The whole philosophy of medical science has of late been subverted through the gradual discovery of the extensive species of minute beings called bacteria—the lowest order of beings known to exist. They were once believed to be the product of a *generatio æquivoca*—of spontaneous generation—until it was made evident by Pasteur that they are generated *ex ovo*—from the egg. Philosophers have, however, then subsequently not abandoned faith in spontaneous generation, from the original elements upward, but have put the bacteria up as a rather composite race of beings, made up from many millions of molecules, and established a belief in a class of organic beings as progenitors, as it were, of the bacteria, which beings are said to be many times simpler in their composition and smaller than are the latter, and so minute in size that they will forever be hidden from human sight. All diseases and ailments of the human system are, in accordance with an overwhelming number of medical philosophers, owing to encroachments thereon by bacteria, as destroyers of blood and tissue.

Some twenty-five years ago Professor Naegeli mentioned some very interesting and, as I believe, important experiments as to the life of the lowest orders of fungi, of which our bacteria are the lowest yet. He prepared a proper neutral nourishing fluid, and put therein the seeds of mould fungi, fermenting fungi, and bacteria. The result was that the latter exclusively went on to multiply at the expense of the nourishing fluid, so that not a trace of the other two kinds of fungi could be found. He then added 1 per cent of tartaric acid to a fresh dish of nourishing fluid. The result now was that the fermenting fungi had the field for themselves exclusively. A third experiment, with 5 per cent of the acid added to the fluid, gave the field to the mould fungi. Singly, each kind of fungi would grow in either kind of nourishing fluid, but in competition with each other the field was conquered by one kind exclusively.

Arguing from this fact, Naegeli justly asserts that the blood corpuscles, as principals within their nourishing fluid, ever prevent the growth therein of other fungi, which are constantly inhaled with the air, thus coming in direct contact with the blood of the lungs. The blood corpuscles ever do this so far as they are in sound condition. But, alas! they are often weak and often subject to debilitating effects, so that the foreign fungi get a chance to grow and multiply, so rapidly, indeed—doubling their number within every few minutes—that within a few hours the blood's life, and therewith the life of the being, may be destroyed.

Within the child there flows and grows the blood of its parents, and all the latter's ills and ailments that human flesh is heir of accompany the child. The German student expresses this in the jocular statement that every man "should be most careful in the selection of his parents."

A birthplace of bacteria is below the ground, nearest the level of ground water. As the water recedes, the fungi get dry, and slowly rise with the ascending air current to the surface and into the atmosphere, there to be, by chance, inhaled. Assuming a grain of fine sand to be 1-200 of an inch in diameter, the number of grains per cubic inch is 8 millions; further, assuming the interstices between grains at one-fourth, we may safely count 32 millions of interstices as taking up the entire space of a cubic inch. A single interstice may thus contain: Thirty grains of sand dust = 600 blood corpuscles = 24,000 microbes. A single microbe, of medium size, may, therefore, very conveniently ascend within a body of even the finest sand, within the pores of rock, of brick, mortar, and concrete. It finds no sort of impediment in any dry substance excepting dense clay, so far as it is not wholly dry.

Such clay protects, as is substantiated by the following account of Dr. Pohl: A country gentleman had on his estate seven one-story houses inhabited by laborers. These houses were dilapidated and dirty. Their floors were a sort of concrete, made of clay. The houses were doomed to be destroyed, to make room for commodious tenements of a better class. At a time when cholera visited the place, five of the houses had been renewed with floors raised from the ground, which had been deprived of the layer of clay; two were in their previous condition. The disease laid up 18 of the inmates of the new and improved, ostensibly far more sanitary, houses, and none at all of the two rotten and dirty houses. The result could only be attributed to the fact that the clay floors had effectually prevented any preparatory disease germs to rise within those houses.

I have at last arrived at my task proper. Bacteria are at all hours generated in the soil under our very homes. they rise, and are inhaled by us as the inmates. Among them there may at any time be some of the kind which cause disease, which might or might not grow at the expense of our blood, as circumstances beyond human control would govern. The upward current, which brings them to us, is augmented in winter, as we well know, by the reverse of temperatures. Where human well-being and life are considered worth anything, there the architect of the present day should, without fail, pay due attention to such construction of a residence building as would fairly warrant a protection against all ascending air currents ever present under its floors and in its walls. The task is neither difficult nor expensive, as we shall see, and no excuse can effectively be offered on this score.

Common materials most likely to be proof against penetration of microbes are: asphaltum, glass, and pitch tar. The asphaltum to be had in form of pressed plates. All these materials can be most readily had and employed. Asphaltum or glass, in two layers on proper mortar, to be put in all walls at the level of lowest floor. Asphaltum also to be put against exterior walls, terminating below lower water table. Concrete, with level surface, established on the entire ground, to be covered with a coat of pitch tar and tarred felting, which may be repeated once or twice, to be lastly covered with a proper layer of finish concrete. Where wooden floors are required, the finish concrete may contain the required sleepers. Where desired, a further protection can be had by spreading a sheet of lead under the furnace stand prior to making the last concrete. Even the entire surface of basement may thus be advantageously covered, where expense is no objection.

These arrangements, carefully executed, are unquestionably calculated to produce the nearest positive impregnability of floor and walls of a house, though we must conceive it as next to impossible to give absolute evidence as to such effect. We must rest our assurances on the degree of impregnability of the substances employed and on the accurate manner of their employment. The arrangement excludes the use of iron sewers and requires all water supply pipes to be suspended from the basement ceiling. Return pipes of a steam heater, and cold air ducts, must likewise be thus suspended. Iron sewer pipes are objectionable for several reasons. Iron is a bad material to be put underground. It decays. The decay is augmented by the acids of the liquids within the pipes, and the flow is impeded by rust. Arrangements for cleansing are, therefore, provided at short intervals. Earthen sewers, on the other hand, if well made, are of the most enduring material within our mechanical province, and should not be rejected because they are generally so bunglingly applied by our mechanics. Good sewering requires the excavation of all trenches at one time, and a concave concrete foundation on a gradual and even pitch for all sewers. The sections should be laid in mortar of Portland cement, and connected by means of metallic rings, which will insure permanency. The receiving ends should be fully turned up, and have a socket in which is fitted an iron member receiving the soil or the waste pipe, both being provided with a tight slip joint. The joints within the socket to be tightened with a mixture of asphaltum and sulphur. Provisions thus properly made, with due care and foresight, are unquestionably calculated to secure residence buildings in a desirable measure against the encroachment of those invisible beings which are the ever-present and most persistent enemies of the human race.

The Vicissitudes and Perseverance of an Inventor.

Patents extraordinary in character and history are becoming alarmingly frequent, but we must preserve a unique position for one which has just been granted to Mr. George F. Green for an electric railway. The daily papers have within the past few days given somewhat sensational accounts of his inventions. The facts are these, as related in the *Electrical World:*

Mr. Green has been for many years a resident of Kalamazoo, Mich., earning a livelihood as a working mechanic, and filling up what small spare time his trade allowed in the study of electricity. Years ago, in fact as early as 1856, shortly after the striking experiments of Page had drawn attention to electric traction, Mr. Green, like others of his countrymen, was impressed with the importance of the subject, and spoke of it to his neighbors. In 1875 he was enabled to put his ideas into practice on a small scale, and constructed a little track on which to run a train of cars drawn by a motor of his own construction, which was supplied by current from storage batteries through the medium of the rails as conductors. Later, in 1879, another and larger model was constructed capable of embodying the same ideas. The inventor fully appreciated the advantages of the dynamo for the purpose of supplying current, but he was poor and no dynamo was available. In fact, in 1879 he was compelled to act as his own patent attorney, and the claims which he then put in were technically informal and hence encountered many obstacles in the Patent Office; interferences were declared and his application—even after an appeal to the Commissioner of Patents—was finally rejected. Not discouraged, however, and firm in the belief of his priority, the inventor carried the case to the Circuit Court of the District of Columbia, the final legal resort after an adverse decision by the Commissioner. It, after reviewing the evidence, passed favorably upon his application; and, pursuant to the decision of that court, two patents were granted on December 15. The claims of both these patents form, indeed, an interesting chapter in the history of electric traction.

Although similar ground had been covered in the days when the primary battery was the only available source of electricity, Mr. Green's work was done long before the final impulse had been given to electric traction by the researches of Dr. Werner Siemens and contemporaneous inventors in this country. It forms the connecting link between the old and the new in the history of the application of the motor to railway service, and whatever its value as a patent may be, as a contribution to our history the documents granted a couple of weeks ago possess no small importance. The work of the pioneer is difficult, especially when it is hampered by poverty, and it is hard to give too much credit to those persistent inventors who, in the face of all sorts of obstacles, have carried through their first crude ideas to working success. With more money, or more influential friends, it might have been Mr. Green's fortune to carry out such an experiment as a few years later in Berlin drew the attention of the world to the possibilities of the electrical distribution of power in facilitating rapid transit.

Cost of Power from Small Motors.

In the SCIENTIFIC AMERICAN SUPPLEMENT for this week, No. 836, we give a translation from the *Journal des Usines a Gaz* of a report on this subject made by M. Korte to the Association of German Engineers. The following is an extract from this report:

"M. Korte goes to the very bottom of the details, and as a result the figures are evidence of the carefulness of the examination and of the comparisons that were made. We do not now recall to mind that any other published treatise contains such complete summarized statements of the cost to the user of the four named classes of motors treated of, and have no hesitation in saying that M. Korte's tables will command widespread notice in this country. To the gas engineer they are particularly interesting and full of promise, for they show quite plainly that with well-directed effort on his part the field for small motors should be practically at the mercy of the product that he manufactures. One striking feature of the tables that nominally is against the gas motor is the greater first cost of apparatus and installation. From his compilation we find the following, taking the one horse motor in each class as our specimen:

	Gas Motor.	Hydraulic Motor.	Electric Motor.	Compressed Air Motor.
Total cost of establishing plant............	$408.68	$226.29	$139.44	$237.14
Cost to operate 3,000 hours................	147.98	467.11	561.62	460.71

"But while this excess will act toward causing in the mind of an intending power user an unfavorable first impression, a glance at the totals respecting the annual cost of running each motor 3,000 hours per annum ought to convince the investigator that the gas motor at an expense of $408.68 for first installation was the cheaper instrument at the end of the first year for him by $144.40 than had he installed an electric motor at a first cost of but $139.44, the saving meanwhile having accrued from the difference in cost of operating the machines. In his second year of use, however, the economy will amount to a clear gain of $413.64, and that will be kept up in following years. The reduction of the figures from foreign to American equivalents involved a great amount of labor, and we doubt not that the enterprise which prompted the work will be appreciated by our readers."

THE Bureau of the American Republics announces the discovery of vanadium minerals in considerable quantity in the province of Mendoza, Argentina. Vanadium is one of the rare elements for which there is a limited demand, and commands an exceedingly high price, being quoted, so says the *Engineering and Mining Journal*, at $22 per gramme at present (over $700 per ounce). It is used chiefly in the form of ammonium vanadate, as a dye stuff, producing, in conjunction with aniline, the most absolute black known to the dyers and calico printers. It is similarly used in the manufacture of certain kinds of black ink. The amount required for these purposes is, however, extremely small.

The vanadium minerals are widely distributed, although seldom found in large quantities. The ores in certain districts of Arizona contain a considerable amount of vanadate of lead, and there has been some talk of saving the mineral as a by-product, but the present demand for the vanadium salts being so limited it is doubtful if such an undertaking would be worth while.

The manufacture of vanadates is in the hands of two or three houses in Great Britain and on the Continent. The price is kept high, because the consumption is so small, and because any serious competition, increasing the supply, would destroy all the profits of the business. Under these circumstances, present uses will have to be greatly extended or new ones developed before vanadium ores will acquire much value. All that can well be done with them at present is to sell them to the manufacturers who monopolize the industry, and a very small amount will satisfy that possible demand.