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**Contents:**

(Illustrated articles are marked with an asterisk.)





## THE ERIE CANAL.

When, in 1816, DeWitt Clinton presented his celebrated memorial, with one hundred thousand names appended, to the New York Legislature, asking for an act authorizing the construction of the Erie Canal, it is doubtful whether he foresaw the storm of opposition his proposition would raise; and when, at last, by his untiring energy, he secured an appropriation of $5,752,738, and saw the first shovelful of earth raised, at Rome, on the succeeding 4th of July, it is probable that he realized still less the brilliant future of that—at the time—stupendous project. Still less did he foresee that scarcely would the work be completed ere a new system of transportation and traffic, exceeding in rapidity anything the world had ever dreamed of, would spring up, and, stretching its "steel-shod grooves" parallel with this world-famous canal, rival the latter in carrying power for freights, and totally extinguish its passenger traffic.

Many are still living who have been huddled in the closely crowded cabins of the old-time packets, whose sharp prows no longer cut the waters of the Erie Canal. And some have, perchance, had the experience of a trip in a lazy line-boat from Albany to Buffalo.

The writer well recollects such an experience, and can call to mind the table supplied with steaks of fresh pork, flanked with boiled potatoes, tea and coffee, bread and butter, and apple sauce, which formed the standard dinner; the cabin which, the tables being removed, was crowded with sleeping berths, the males being separated from the females by a rude curtain, and mingling their snores in anything but harmonious concert; the long drawn cry of "Lock red—d—a—a!" easily heard half a mile away, in the still night air; the shrill cries and screams of impudent boy drivers, receiving castigation at the hands of irate captains; the startling crash of pike poles, thrown down upon deck immediately over the heads of the passengers, causing those in the up per berths to jump up, half awake, and bump their heads against the deck timbers; the curious sensation of sinking down unfathomable depths, in going through locks; the early rising in the moist, foggy air; the ablutions, performed in ways and by means indescribable, or, in many cases, left unperformed; the rush to breakfast; the broiling through the long summer day on the deck, the monotony only varied by occasional cries of "Bridge—Low Bridge "from the "steersman," and the general scramble and ducking of heads which followed, or by stale stories and feeble jokes, from the more humorous of the passengers, or perhaps by, what was then frequent, a fight between boatmen. These were the charms of travel over the Erie Canal, "but all these charms are fled."

The writer well recollects standing in the village of Canastota, filled with wonder at his first sight of a locomotive and train, coming on at a speed of perhaps fifteen miles an hour, over the Central Railroad, and it was not long after that the waters of the Erie practically ceased to carry passengers. From that time, destined to be only an artery for the circulation of freight, it has been sought to improve its carrying capacity. All these movements have been opposed by the railroad interest, yet the people at large have seen too clearly how much the prosperity of the State has depended, and still depends, upon this great work, to allow the defeat of such measures. Its capacity has been greatly increased by enlargement of its cross section and its locks; and many attempts have been made to give it still greater carrying power, by the substitution of steam for horse and mule power in the propulsion of boats, culminating in the bill we published last week, offering a prize of $100,000 for the best system of propulsion.

This prize will have the effect of bringing to bear upon the problem a vast deal of inventive talent, and if fairly awarded, will be quite as likely to be secured by some ingenious farmer's boy in the backwoods, as by a skilled engineer, versed in the mysteries of steam engineering. For it must be remembered that the solution of this problem does not depend upon any novel construction of steam engines, but upon means not hitherto employed for applying the power of motors to the propulsion of these boats, under the conditions specified in the law, or upon some radical modification in means already used, but as yet found defective. It is a new path that must be struck out, in which old devices will be of little use, except as elements of new combinations; and, we venture to say, there are many undeveloped Watts and Ericssons, who to-day are masters only of few tools and rude appliances, huddled together in their fathers' horse-sheds, who would be even more likely to hit upon something new, than men whose minds have become accustomed to run in grooves, and who recognize, in the screw and paddle wheel, the only practical means of steam propulsion.

The effect of the prize will be, however, broader than was intended by the framers of the bill. Those who attempt the solution of the problem will stumble upon many inventions capable of useful application to other purposes. The construction of the canal banks and locks may even undergo material change, ere the anticipated system of propulsion can be applied. It may even prove that in such a modification, of the construction of the canal, lies the solution of the entire question. But these are things that time only can develop.

In our next issue we propose to resume this subject, perhaps giving more particulars, historical and statistical, of the origin and progress of the canal, and following with some account of patents issued on means of canal boat propulsion in the United States.

We shall also be glad to receive contributions from our correspondents upon this, now more than ever, important subject.

## PIPES FOR DOMESTIC WATER SERVICE.

There is nothing about which we receive more numerous inquiries than water pipes. Most people are getting suspicious of lead for this purpose, it having been shown that this metal often contaminates the potable waters conveyed through pipes made of it. For a time, quite a popular impression prevailed that in zinced, or, as commonly called, galvanized iron pipes, the cheap and safe water conduit for for domestic purposes had been found. This is still maintained by some, and it is with a view to throw additional light upon the subject that the present article is written.

There is no doubt, as we have shown in previous articles, that iron pipes, thoroughly coated with zinc, and conveying perfectly pure water, will not contaminate the water to any appreciable or hurtful degree. Waters containing acids or free alkalies will, however. speedily become charged with the oxide or salts of zinc, to a greater or less extent, depending upon the character of the water. In some cases, where there does not appear to be a notable amount of alkalies, acids, or salts, the solutions of which dissolve or combine with zinc oxide, there is still rapid attack upon the metal. We have a specimen of such a pipe that is nearly filled with a deposit of metallic origin, resembling mixed metallic zinc and red oxide of iron. An analysis of this deposit would be interesting. Pure water acts more powerfully upon lead than upon zinc. While the oxide of lead is readily soluble in water free from carbonic acid, it is converted into a comparatively insoluble, or difficultly soluble, carbonate, whenever it is exposed to water containing carbonic acid. In experiments made by the Government commissions appointed to examine into the chemical quality of the water supply of London, the extraordinary effect produced by a small quantity of carbonic acid in the way described was most particularly noted. Pure distilled water placed in contact with lead became highly poisonous, while that containing three per cent of its volume of carbonic acid remained safe. They decided that sufficient carbonic acid is usually found in well, river, and spring waters, to render lead pipes a safe means for conducting them.

Notwithstanding this, they admit that, from causes little understood, water will at times act with unusual energy upon lead; and we have no doubt that imperfectly understood conditions will often render it powerfully energetic in its action upon zinc coated iron pipes. The specimen of this kind of pipe, above referred to, which has almost become stopped by its deposit of mixed oxide, metallic granules, and salts, would seem to indicate this, as the water which flowed through it has always been regarded as being of ordinary purity for drinking and culinary purposes.

A prominent leader in the Shaker family at New Lebanon, N. Y., assures us that they have not succeeded in the use of zinc coated pipes; and regarding lead with disfavor, they are meditating a return to the old pump log service, once so much used in this country.

We are cognizant of another example, in a town near Boston, Mass., where a new house was piped with galvanized iron pipes. Sickness soon overtook the family, one of its young members died, and a *post mortem* examination revealed the presence of salts of zinc in the stomach and other organs. Death was directly attributed to the use of these pipes.

Mr. Robert Rawlinson testified, before the commission referred to, that galvanizing iron pipes is a delusion. He said: "If the pipes are laid in subsoils which will act upon iron, the galvanizing affords no protection against that action, and there are soils which will rapidly eat away either iron or lead. If you examine a galvanized iron pipe under a microscope, you will find that it is not an even coating; it is freckled, and there are interstices, oxidation sets up, and then the galvanizing is blistered off; it does not improve, and, even so far as it does cover it, I doubt very much whether it preserves it; it is not stronger in its texture, and it certainly does not last longer; that is my experience."

Mr. Thomas Duncan, engineer of the Liverpool Water Works, stated that "the effect of soft water upon iron pipes was to produce an infinite number of small tubercles; those have grown up, and they project, in many instances, for about three quarters of an inch, reducing the diameter of the pipe between point and point, one and a half inches, thereby increasing the friction. They form an infinite number of little eddies, and it is not only the space they occupy in the pipe, but, from my observation, I believe the effects extend much further into the interior of the pipe, and disturb the current."

A method has been recently patented for coating pipes internally by silver electroplating therein. Water containing sulphur would, of course, in time convert such a coating into the sulphide of silver; but this, being insoluble in water, would protect the pipes as well as the metallic silver. Should the water contain any alkaline hyposulphites, and also free chloride, the silver may be gradually converted into a chloride, which, being dissolved by ammonia, would, after a time, result in the denudation of the lead. Of course, the time required for this action, if it should take place, can only be determined by experiment; but in such waters as contain traces of the substances named, such action would seem likely to result ultimately. It is known that silver exposed to an atmosphere containing chlorine will gradually blacken from the formation of chloride; and it is probable that this would occur, to some extent, in water pipes coated with silver. The cost of the metal will stand in the way of using a very thick coating; and, therefore, any chemical action will be more apt to interfere with the economical application of silver to this purpose.

In Boston the lined copper pipes are coming into vogue, and are pronounced perfectly safe in all respects. The copper is tinned before being made into tubes, and the interior of the pipe is again tinned when made up. The expense of these pipes is about the same as lead pipes of equal strength.

## THE BLOWPIPE AS AN AID TO THE DRILL IN OPENING SAFES.

The blowpipe, in an attack upon a *well constructed* safe, is a powerful auxiliary to the drill, but it cannot be used alone with success.

Some experiments with most skillfully constructed apparatus, performed at the Herring safe manufactory, in this city, which we witnessed last week, show that the temper may be drawn, in time, from a steel plate an inch thick, by the use of the blowpipe, so that the plate may be drilled. It may also be burned quite through when operated upon singly; but it is difficult to do this with iron plates, which burn less easily, and also conduct heat away from the point against which the flame is directed, as rapidly as the steel. Spiegeleisen burns with even less facility than ordinary iron. The flame directed against the corner of a fragment of speigeleisen fused it, but, after continued action, only produced a comparatively small amount of the oxide of iron, which coated the bead formed. The fused metal, on cooling, was as hard as before. This material, in fact, depends for its hardness upon its natural composition, and not upon any process of tempering, so that mere melting does not change its character.

It would, however, require apparatus not available to burglars to melt a hole in the center of a speigleisen plate. It follows, therefore, that while iron plates and steel plates may be successively penetrated by the use of the blowpipe, as practically capable of use in the hands of burglars, the speigeleisen plate, which practically resists drilling, defeats the use of the instrument as an adjunct to the drill.

We have recently held a conversation with Mr. John Dickinson, of 65 Nassau street, New York, manufacturer of carbon points for drills, etc., who assures us that these points will not drill speigeleisen, except by the use of appliances for obtaining speed, which cannot be used by burglars, and that to drill it at all would be a work of so much time as to prevent its adoption for safe-breaking.

The rate at which, by the ultimate use of the blowpipe and drill, a hard steel plate can be penetrated, is, we are told by Mr. Farrell, about one inch per hour; the drawing of the temper in advance of the drill occupying about two fifths as

much time as the drilling. It is found that the alternate use of these instruments enables more rapid progress to be made, than when it is attempted to draw the temper entirely through the plate at a single operation.

## IMPORTANT DECISION BY THE COMMISSIONER OF PATENTS.

On the 8th of July, 1870, amendments to the patent laws went into operation, providing, among other things, for the issue of patents for trademarks. Commissioner of Patents Fisher, with his customary promptness, at once established rules to facilitate the new issues; and decided, overruling the Primary Examiner, that any trademark, whether consisting of mere words or accompanied by a device, might be the subject of a patent. Under this ruling, a number of applications were filed and patents granted; soon after which, Commissioner Fisher resigned. No sooner was his back turned than the Primary Examiner began to nullify the new practice, by rejecting those applications for trademarks that consisted of words, only granting those that were accompanied by a figure or device. The acting Commissioner declined to interfere, and left the matter for settlement by the incoming Commissioner, Gen. M. D. Leggett.

The new Commissioner has just rendered his decision, and, we are gratified to be able to state, he gives to the law a broad and liberal interpretation, fully sustaining the ruling of his predecessor.

Commissioner Leggett decides that patents may be granted for trademarks of all kinds, consisting of one or more words, either with or without other devices. But the mere name of a firm or corporation cannot be patented, unless accompanied by some other word, device, or "mark." The document is clear, concise, and interesting. We publish it in full, on another page.

This decision is very timely and judicious. So long as manufacturers are assured that they may hold, as their own property, and derive benefit from, the particular marks that they place upon goods, they will take pains to improve the productions; and the patented trademark will become a certificate of genuineness and excellence.

We are glad that the narrow views of the Primary Examiner have been overruled in this instance, as in so many others during the past twenty years. The difficulty with such superannuated officers is that they are fussy, adhesive to past traditions, and unable to accommodate themselves to the progress of the age; and, as Patent Office examiners, they create delay and difficulty in the transaction of business, by unnecessary or whimsical rejections of legitimate claims. The usefulness of the Patent Office ought not to be thus obstructed. We trust that the new Commissioner, like a new broom, will sweep clean, and remove all the cobwebs that stand in the way of an enlightened, liberal, and vigorous administration of the Department.

We have been asked what is the especial value of trademark patents, in view of the fact that the State courts are ready to afford protection against infringers? We reply that a United States patent for a trademark is valid in all the States and territories; and a decision made in any one United States court is respected in all the States. The trouble and expense of separate infringement trials in each State is thus avoided. A trademark patent costs in all only thirty-five dollars; whereas a single suit for infringement in a State court often costs five hundred dollars; and the decision of one State court is not binding in another State. Moreover, the possession of a regularly issued patent for a trademark is a preventive as well as a protection against infringers. Few persons will venture to begin an infringement in open defiance of a known patent. The advantages of trademark patents are obvious.

By the terms of the new law, patents may now be had for business stamps or trademarks of all sorts, no matter how long they have heretofore been used. The proceedings are quite easy and simple. We shall be happy to communicate with any of our readers who desire further information upon the subject.

## HEALTH IN OLD AGE.

William Cullen Bryant, the poet, and editor of the New *Evening Post*, is now almost seventy-six years of age, but he is as active and vigorous as most men of fifty. He is the impersonation of good health, the result of long-continued habits of good living. His stalwart form and flowing beard of gray often attract our attention as we see him passing our office window, on his way down town, after a brisk morning walk of three miles.

Mr. Bryant has lately permitted the publication of a familiar personal letter, in which he makes known his general manner of living. From this it appears that he is very frugal in diet, and very generous in the matter of bodily exercise. He rises early, and at once engages in exercise for an hour, in his room, with light dumb bells, the bar, a chair, etc. Then a bath, then breakfast, taking no tea or coffee, no meat, but simply hominy and milk, oatmeal, wheaten grits, cakes, baked apples, or other fruits. After breakfast, study for a while, then a long walk. An early dinner, taking a little meat. Supper the simplest, fruit, bread and butter. No study, no thinking, no writing of any sort in the evening. Early to bed. No toddy or stimulants of any sort. Mr. Bryant's faculties are all in good order. His mental vigor is remarkable. Not the least wonderful fact in his history is, that from early childhood his intellectual powers have been constantly worked. As a youth he was precocious. Before he was ten years old, he was a poetical contributor to the papers: and at fourteen, his first volume of poems was published. After a college education, he studied law, and became quite distinguished in Connecticut. For the last forty-five years he has been connected with the *Evening Post*, which is one of the best daily papers in the world. His literary productions rank among the very highest.

## INVENTIONS MADE BY WORKMEN.---WHO OWNS THEM?

The rights of employer and employé, in respect to ownership of inventions developed during the term of service of the workman, although settled, years ago, by the ruling of United States Courts, in various cases, has been lately revived in the Supreme Court in this city, on the appeal in the case of Lawrence *vs.* Good.

The latter was a foreman in the rope factory of the plaintiff, and, while so employed, made an improvement and obtained a patent, for converting hemp into slivers. The patent was said to be worth at least fifty thousand dollars.

The plaintiff alleged the existence of an agreement, by which he was to furnish means for introducing the invention, and, in consideration thereof, was to be entitled to one half of the patent when issued. This suit was brought to compel the defendant to assign the above share of the patent; and the plaintiff also contended that, even in the absence of an agreement, he was entitled to the benefits of the invention, the same having been made while the defendant was in his employ as a workman, the improvement being also in the line of such employ.

The Court decided, first, that the existence of the contract was not proven. Second, that, while the plaintiff had a legal right to the services of the defendant in the line of his employment, he had no legal right to the results of defendant's intellectual labors, outside his ordinary duties; and that this invention was clearly outside of such duties.

This decision is in accordance with the rulings in previous cases, in which the following, among other points, have been established:

1. The employer is entitled to the patent if he directs a workman, generally, what kind of an improvement to make; the employer has the right to avail himself of the ingenuity and mechanical skill of the workman to perfect the invention, or put it in practical form; and the employer has also the right, under the circumstances named, to include in his patent such additions or improvements as the ingenuity or skill of the workman may have developed or suggested.

2. On the other hand, the employer has no claim upon any independent invention made by his workman, although such invention may relate to the special business or trade in which he is engaged; the sole right to the patent for such independent invention belongs to the workman.

Complaint is made by employers, that some workmen are so mean as to make use of time, materials, and shop conveniences, belonging to the employer, for the purpose of testing inventions, without so much as a thank-you for the facilities thus surreptitiously obtained. This is neither right nor honorable; but it is not any meaner than for an employer to bring a suit, as in the foregoing case, and attempt to deprive a man of a patent simply because he is his workman.

## SCIENTIFIC INTELLIGENCE.

### PREPARATION OF PURE BENZOLE.

Professor Hofmann recommends, for the purpose of procuring perfectly pure benzole, its exposure to a freezing mixture and then pressing it out. The frozen cake is put into a brass cylinder, 8 to 10 centimeters wide, and 40 to 50 centimeters deep, into which is fitted an iron plunger, pierced with numerous holes. It is better to freeze the benzole in the press. After squeezing out the liquid, the melted benzole will be found to be of unusual purity.

### ADAPTATION OF UNGROUND GRAIN FOR FOOD.

At the meeting of the Academy of Sciences, of Paris, held on the 26th of September last, a discussion occurred on the application of unground grain for purposes of food. The subject was at that time one of vital importance to the Parisians.

M. Grimauld reported that, during the siege of Venice by the Austrians, the following process had been pursued. The grain was first softened in water, and rubbed to free it from the hulls, and was then boiled with vegetables, and seasoned. It produced an agreeable food, and must have been nourishing, as it was composed of a mixture of gluten and starch, and was the exclusive article of diet, of fourteen persons for two months.

Dumas remarked that the entire kernel could be eaten, and it was complete in itself; by grinding and bolting, much nourishing substance was removed and lost. It was not a matter of indifference that, of the 11,000,000 pounds of grain on hand at the commencement of the siege, only 7.700,000 pounds should be counted as food. The Romans in the first century were in the habit of roasting the kernels, grinding, and making the meal into a paste; and they regarded the baking of bread as wasteful.

The Arabs at the present time eat grain that has been hulled and boiled with steam. It is generally assumed that four parts of grain will yield three parts of flour; this is a waste of one fourth that ought to be saved. In England, brown bread, containing all the constituents of the grain, is regarded as a luxury, and is baked as often as twice a week.

Payen called attention to the fact that, according to Grimauld's proposition, 25 to 30 per cent of the nourishing properties of the grain was saved, which was ordinarily lost in the bolting; and the resulting paste afforded a more nourishing, healthier, and cheaper food, as the gluten contained certain nitrogenous substances in greater quantity than the other constituents of the grain, which were easily assimilated and were good for the digestion. Even the indigestible part of grain played a part in the digestion, as was abundantly proved in the English brown bread made from unbolted flour. The problem to make bread from the entire grain has been solved by Sezille, who slightly moistens the kernels, then rubs off the hulls, by which only a loss of 5 per cent is incurred; then he soaks for seven or eight hours in tepid water, until it can be easily crushed between the fingers, by which it takes up 50 to 60 per cent water; he then converts into paste between rollers, and bakes into bread after fermentation. Payen had eaten such bread, and pronounced it excellent.

### HEALTHY SOIL AND WATER.

According to Chevreul, a soil is not adapted to the sprouting and growth of plants, unless the seeds and the spongioles of the roots can obtain access to the oxygen of the atmosphere. Substances absorbing oxygen, such as sulphide of iron, and sulphide of calcium, are therefore prejudicial to vegetation, while draining is beneficial.

Animals can only live in water that contains oxygen, and hence whatever removes this element from the water, destroys it for the lower animals. Fish improve stagnant water, by devouring organic substances, and vegetables produce the same effect by taking up organic matter, and giving off oxygen in the sunlight. Flowing water is, therefore, more wholesome than stagnant. Soil is injured by oil that condenses in gas pipes, and by dead vegetation. It is necessary to the health of a house that it be exposed to air on two sides, and that light can penetrate to the interior, and that the air of all apartments can be frequently renewed.

### GLYCERIN SOAP.

In the manufacture of soap, since time immemorial, all the glycerin has been thrown away, but in later years the healing and antiseptic properties of the glycerin have rendered its combination with the fats and oils very desirable, hence we hear a good deal about glycerin soaps. Unfortunately, most of the soaps of this name contain little or no glycerin.

Fashion and the ignorance of the public demand a transparent soap, and this quality is incompatible with a considerable percentage of glycerin. Transparent soaps owe their clear property to the addition of alcohol, and glycerin produces an opposite effect.

Glycerin soaps ought to contain 25 to 30 per cent of that agent to be really valuable, but rarely show more than three or four per cent. It would be more candid if soap manufacturers would undeceive the public on this point, and make a true glycerin soap at a price that would afford them an adequate profit. A glycerin soap, with some ammonia, would be a truly valuable article for wounds and bites of insects, but its value ought not to be destroyed by attempts at fancy coloring or transparency.

## ON A METHOD OF DETERMINING THE PERCENTAGE OF WATER MECHANICALLY SUSPENDED IN STEAM DELIVERED FROM BOILERS WHICH PRIME.

A Paper read before the Society of Practical Engineering, April 26, 1871, by Leicester Allen, Associate Editor of the SCIENTIFIC AMERICAN.

The second annual report of the Inspector of Boilers of the city of Philadelphia, states that out of fifty-six men who presented themselves during the year 1870, for inspection and license as engineers and boiler tenders, only four were considered first class, Out of thirty-nine who sought examination for a renewal of their licenses, only nine were first class. A large proportion were only third class. I am not aware what the standard of classification, adopted in Philadelphia, is, but it is probably none too rigid. It is, probably, also fair to suppose that those who sought examination were better than the average of those employed to take charge of boilers; since there is, in that city, no penalty imposed for the employment of unlicensed engineers or boiler tenders. I deem it, therefore, extremely probable that the four receiving first-class certificates, out of the fifty-six examined, represent even a larger proportion of thoroughly qualified men, than would be shown if a general system of examination and license were legally enforced.

In view of the general incompetence of those placed in charge of boilers, not only in Philadelphia, but throughout the country, the use of boilers, not only safe with good care and treatment, but safe even under neglect, has been gradually growing in favor, notwithstanding most of the boilers, justly regarded as being incapable of explosing disastrously, do not compete, in point of economy, with others, which, unskilfully attended, are liable at any moment to explode with destructive violence.

The year 1870 has a most appalling record of death and destruction from boiler explosions, and it is time that the question of safety *versus* economy, in the use of boilers, should be definitely settled. The first step toward settling this question is the accurate determination of the real ratio of economy in boilers admittedly safe, under all circumstances, to those admittedly unsafe, except when used with the best skill and fullest knowledge.

The safe boilers are those known as *"sectional,"* in which very great strength in proportion to rupturing strain is attainable, and which—even if, under enormous pressure, they explode—cannot explode as a whole, but can only burst some minute portion of their structure. These boilers could, some of them, make a fair showing of evaporative power, in proportion to consumption of fuel, without forcing; but in trials made to ascertain their steam producing capacity, their exhibitors are apt to force them until they prime, and thus the amount of water passed through them becomes no index of their economical value as steam generators. These boilers also present such an enormous heating surface, in proportion to the water they carry, that, in practical use, they may be caused to prime by slight overfiring; and, with the ordinary