Correspondence.

Keeping Beer with Oil.

To the Editor of the Scientific American:

In this country we continually have thunderstorms from March to October. For months together a night never passes without one more or less severe, generally the latter. I always keep beer on draught, and find it *never* goes sour if it is hermetically sealed by having *oil* poured on the top. This should be poured into the barrel when tapped. On the other hand, without the oil the beer does not keep a week. ASSAM.

Assam, Bengal, April 30, 1884.

How Earthenware is Made.

The Trenton potters use for their white ware, clays from the State of Delaware and Delaware County, Pennsylvania, which are totally or almost entirely free from oxide of iron. These clays are found in the place of their first deposit, and therefore contain all the sand of the gneiss or granitic rock of the disintegration of which they are the product. New Jersey clay, which is not found free from oxide of iron, but is very much more plastic, is mixed with these clays to render them manageable. All of the seggars, however, that are used in the Trenton potteries are made of New Jersey fire clays. The value of good fire clay to the potter will be understood, when it is considered that true porcelain could not be made in England, owing to the scarcity of a cheap material for seggars, ten per cent of the ordinary seggars being lost in the firing of true porcelain.

The process of preparation of clay for making good ware is as follows: After having been washed, the clays, reduced to the consistency of cream, are separately passed through lawn sieves, and are then mixed by measure in proportions that will give the required plasticity in the mixture. The mixture is now allowed to evaporate in troughs or "slip kilns," under which furnace flues run. When a uniformly doughy mass is obtained, the prepared clay is taken from the troughs, passed through a pug mill, cut into rough lumps, and is stored for a time not exceeding one year in a damp cellar, where it disintegrates by fermentation. The process of preparing the rotted clay for actual use is called "slapping" or "wedging." A large mass of clay is placed upon a bench, and the workman, cutting it through with a wire, lifts up the upper half, turns it about half way round, and throws it down violently upon the half which remains on the bench. The operation is repeated until the mass is intimately mixed, and every vesicle containing air has been broken and the air expressed.

The process of preparing porcelain paste is much the same as that employed for the stoneware paste, a stirring vat being employed to knead up the mass of water with clay before it passes to the subsiding vats. The grinding of the feldspar, chalk, broken porcelain, etc., which enter into the composition of the paste, must be well done, and all particles of iron, mica, and such foreign substances must be removed. The ingredients are mixed either in the form of slip or in the form of dry powder, the latter being the least convenient method, but more accurate. Analysis of the best Sevres porcelain manufactured between the years 1770 and 1836 gave this result:

Silica	58·00
Alumina	34·00
Lime	4·5
Potassa	3·
	99·5

The mixture is freed of superfluous water by being subjected to hydraulic pressure in closely woven sacks.

There are three methods of fashioning the innumerable and various articles made from clay. The first and most ancient is that of throwing, in which the thrower or jigger throws down a lump of clay upon the revolving table of his lathe. Using both hands he works the lump into the shape of a rude cone, and then flattens the mass within a few inches of the table, the object of the operations being to force out any air bubbles that may still remain in the clay. By means of his hands and fingers, and referring continually to measuring sticks, he fashions the vessel according to a model or after his own fancy.

Few jiggers are employed in our potteries, the best example of this art being found in the country earthenware potteries. Presswork is the method commonly employed. This work is done in moulds made of plaster of Paris, one-half of the pattern being formed in one side of the mould, and the other half in the other side. The two moulding pieces are then fitted accurately together. Handles are moulded separately and fastened on with slip. Handles of teapots, fluted solid rods, and all such slender ornaments are made by forcing clay, under great pressure, through a narrow hole in the bottom of a piston previously charged with dough clay. As the thread of clay issues, it is cut in suitable lengths. From these pieces, the ornaments are bent and fastened on with slip by the handlers. For articles of very irregular shape a method called casting is employed. The two halves of the mould are fastened together, and slip is poured in until the cavity is quite full. As the moulds are previously thoroughly dried, the absorbent power of the plaster soon abstracts the water and makes the coating of clay next to it stiff and doughy. When the liquid is now poured out, this doughy coating remains. If each half has been cast separately, as is the usual practice, the halves are allowed to dry to the green or most tenacious state, and are then joined with slip. The method of casting is that usually employed in moulding porcelain.

Another method of forming articles in porcelain we may call the crust method. The dough is spread with a rolling-pin upon a moistened sheepskin, and is transferred over the mould by lifting it carefully upon the skin. All pieces, whether pottery or porcelain, are finished upon the lathe when they have dried to their greatest tenacity. A moist sponge and knives are the implements used in turning. Owing to the low degree of tenacity possessed by the porcelain paste, hardly more than one-sixtieth as many pieces can be finished for firing in porcelain paste as in stoneware paste, by the same force in the same time.

Seggars are vessels of fire clay, in which all articles except the commonest earthenware are burnt. They are fashioned of clay slabs roughly cut with a spade and compacted with a mallet, over an oval-shaped form. The bottom is put on separately and the whole is fired. The ware is placed in seggars, which are piled upon one another so that the bottom of each succeeding seggar forms a cover for the one immediately below. Only a single article of porcelain paste can be burnt in a seggar, and the bottom of the seggar must be sprinkled with infusible quartz sand to prevent adhesion between the porcelain and the seggar. Seggars for stoneware may be filled, the pieces being separated by variously shaped cockspurs, etc. Stoneware, W. G. ware, and kindred wares are raised in the kiln to a white heat, which is continued for thirty-six hours. The fires are then allowed to cool, the seggars removed, and the biscuit taken out. This biscuit is very porous, and, when dressed of all rough prominences, is ready for the glaze.

The glaze for these wares is usually a "frit," composed of ground feldspar, twenty-five per cent; ground quartz, twenty-five per cent; sal soda, twenty-five per cent; plastic clay, fifteen per cent; and boracic acid, ten per cent; which is fused in a reverberatory furnace, ground in a mill, and mixed with water in glaze tubs. The biscuit is dipped in the slip contained in these tubs, the marks are affixed, and the articles allowed to dry. Since the glaze is much more fusible than the ware, a cherry-red heat is sufficient to fuse the glaze. A porcelain furnace has two stories. In the upper the ware is first fired, the ware being converted into a soft, as distinct from a hard or stoneware biscuit. This biscuit is dipped in a glaze of ground quartz, feldspar, lime, and porcelain clay. In the second firing, which is done in the lower story of the kiln, the glaze and the biscuit are fused together, producing a translucent mass. Stoneware, granite ware, etc., are chiefly decorated by a process called printing or transferring. The intended design is engraved upon copper or stone, and is then transferred in transfer ink to the surface of a prepared elastic sheet. This sheet is stretched on a frame until the design is brought to the size of the article to be decorated. The pattern is now retransferred to zinc plate by the ordinary process of lithograph printing. The zinc plate is engraved by electricity, and then presents all the gradations in depth and tone of the original design. The printed pattern is applied either to the biscuit or above the glaze, and may be finished by hand and brush after the printing. Decoration is always applied to porcelain over the glaze, the ware being afterward placed in a muffle and subjected to a heat just sufficient to vitrify the colors, which must be of earthy character so as to form colored glasses.—*Glassware Reporter.*

Benzene a Product of Paraffine.

By Drs. Armstrong and Miller, communicated to the Chemical Society.—The authors described the results of their examination of the liquid obtained on compressing oil gas, such as is made by passing the vapor of petroleum through highly heated retorts. They point out that their material is in every respect similar to that examined by Faraday in 1825; and in which he discovered benzene. Besides benzene and its homologues, the liquid from oil gas contains hydrocarbons of the ethylene and acetylene series. It is noteworthy, they say, that the latter are none of them true homologues of acetylene, as they are incapable of forming metallic compounds analogous to acetylide of copper. They are probably all derivatives of allene ($CH_2.C.CH_2$), the isomer of allylene or methyl-acetylene. From the fractions boiling below benzene, two hydrocarbons of the acetylene series have been isolated, methylallene ($CH_3CH.C.CH_2$), identical with the crotonylene separated by Caventon from the mixture of hydrocarbons condensed by compressing coal gas, and hexoylene (C_6H_{10}), identical with that described by Schorlemmer.

The crystalline tetrabromides of these hydrocarbons have both been obtained in large quantity in a pure condition. As yet it has not been found possible to isolate the intermediate hydrocarbon—C_5H_8. The fractions below benzene contain two olefines—viz., amylene and hexylene. A study of their oxidation products shows that both of these are the normal hydrocarbons. The amylene furnishes, on oxidation with permanganate, normal butyric acid. The hexylene is converted into normal valeric acid. In other words, the amylene is normal propyl-ethylene; the hexylene, normal butyl-ethylene. In conclusion, it was pointed out that this is an extension of the investigation of Thorpe and Young. By heating paraffine under pressure at a comparatively moderate temperature, they obtained a mixture, with corresponding olefines, of lower (normal) paraffines down to pentane. At the higher temperature of the oil gas retorts, the paraffines are completely converted into olefines, acetylenes, benzenes, etc. It is not improbable, they state, that the benzenes are products in a direct line of the action of heat on the paraffines; and that they are not built up, as has been supposed, from hydrocarbons of the acetylene series.

DECISIONS RELATING TO PATENTS.

United States Circuit Court.—Western District of Pennsylvania.

STUTZ *v.* ARMSTRONG & SON.—PATENT COAL WASHING MACHINE.

Acheson, J. :

Where it appears from the original papers in a case that a certain feature was within the contemplation of the inventor as a valuable element in a patentable combination, and it is proved that a claim embracing such feature was erased from the original application through a misunderstanding of the invention by the solicitors, *Held* that the Commissioner of Patents committed no error in granting a reissue containing a claim embracing such feature.

The fact that a reissue application was filed within two years after the grant of an original patent, while it may not be conclusive against the charge of unreasonable delay, is entitled to some consideration in view of that provision of the patent laws by which nothing less than two full years' public use of an invention is a bar to an application for a patent.

In determining whether an inventor is guilty of inexcusable delay, the fact that the correction of a mistake by reissue was before any adverse rights had accrued is a consideration of paramount importance, and it ought to count something in his favor that, being of foreign birth, education, and an alien tongue, he encountered difficulties in acquiring a knowledge of our language and laws.

There is no patentable combination in a mere aggregation of old devices which produce no new effect or result due to their concurrent or successive joint and co-operating action; but it is by no means essential to a patentable combination that the several devices or elements thereof should coact upon each other. It is sufficient if all the devices co-operate with respect to the work to be done and in furtherance thereof, although each device may perform its own particular function only.

If a patentee might have claimed an element generally and broadly, most assuredly his more limited claim cannot be successfully impeached.

It is settled that a disclaimer need not be filed until the court has passed upon the contested claims.

United States Circuit Court.—Northern District of New York.

CRANDAL *et al.* *v.* THE PARKER CARRIAGE GOODS COMPANY. —PATENT LOOP FOR CARRIAGE TOP.

Coxe, J.:

A device which could not be used as a substitute for the patentee's invention without the exercise of invention is not an anticipation of it.

Where it can be seen that the patentee seeks by apt words of description to secure what he has honestly invented, and nothing more, the court should hesitate to regard with favor the accusation now so freely made against reissued patents.

A Brief Sermon on Cranks.

The *Burlington Hawkeye* publishes a great deal of nonsense, but sometimes in its amusing way it states indisputable facts. The following is from a recent issue:

What would we do were it not for the cranks? How slowly the tired old world would move, did not the cranks keep it rushing along! Columbus was a crank on the subject of American discovery and circumnavigation, and at last he met the fate of most cranks, was thrown into prison, and died in poverty and disgrace. Greatly venerated now! Oh, yes, Telemachus, we usually esteem a crank most profoundly after we starve him to death. Harvey was a crank on the subject of the circulation of the blood; Galileo was an astronomical crank; Fulton was a crank on the subject of steam navigation; Morse was a telegraph crank. All the old abolitionists were cranks. The Pilgrim Fathers were cranks; John Bunyan was a crank; any man who doesn't think as you do, my son, is a crank. And by and by the crank you despise will have his name in every man's mouth, and a half completed monument to his memory crumbling down in a dozen cities, while nobody outside of your native village will know that you ever lived. Deal gently with the crank, my boy. Of course, some cranks are crankier than others, but do you be very slow to sneer at a man because he knows only one thing and you can't understand him. A crank, Telemachus, is a thing that turns something, it makes the wheels go round, it insures progress. True, it turns the same wheel all the time, and it can't do anything else, but that's what keeps the ship going ahead. The thing that goes in for variety, versatility, that changes its position a hundred times a day, that is no crank; that is the weather vane, my son. What? You nevertheless thank heaven you are not a crank? Don't do that, my son. May be you couldn't be a crank, if you would. Heaven is not very particular when it wants a weather vane; almost any man will do for that. But when it wants a crank, my boy, it looks about very carefully for the best man in the community. Before you thank heaven that you are not a crank, examine yourself carefully, and see what is the great deficiency that debars you from such an election.

Turning Bessemer Steel.

A job in a machine shop of Bessemer steel worked in the lathe with the ordinary turning tool would not come out right; the material appeared to lack tenacity; it crumbled when brought up by the turning tool to an edge. As an instance, some axles for cars on an elevated railroad were scored circumferentially. They were made of excellent Bessemer steel. The scores, somewhat more than a quarter of an inch deep, were turned in the usual way, but before the vees could be finished to a depth of about five-sixteenths of an inch, the metal crumbled at the top of the vee, and the entire job had a ragged look. It was found that the only way to do a good job on this material was to make a collection of toothed mills, and mill the scores instead of turning them. If the axles had been made of tenacious material like Norway or Low moor iron, there would have been no difficulty in cutting clean vee scores possessing all the toughness of the solid material.

Safety of Railroad Traveling.

According to published statements, not a single individual riding on a passenger train in Massachusetts was killed the past year, unless the cause was directly traceable to the carelessness of the person killed. Over 61,000,000 passengers were carried, at an average distance of fifteen miles each. According to this statement, it is safer to be on a passenger train in Massachusetts than to be almost anywhere else. It is a remarkable fact that fewer accidents causing death occur on suburban tains, or those running through thickly settled districts, than in the open and sparsely settled country. The *Northwestern Lumberman* concludes that the reason for this is that more care is taken with such trains; that the shocking railroad accidents that are continually happening are the result of gross and criminal carelessness on the part of both managers and employes.

ROCK CUTTING MACHINE.

The rock extracting industry seems to ever remain at the same point. Little progress has been made in the method of quarrying, and, nearly everywhere, use is still made of the wedge, the lever, and powder. Aside from the cost of the work and its defectiveness, there results considerable waste, while the blocks extracted are irregular in shape. We therefore believe it our duty to make known to our readers a new machine for cutting rocks, the invention of an engineer, Mr. Rapp.

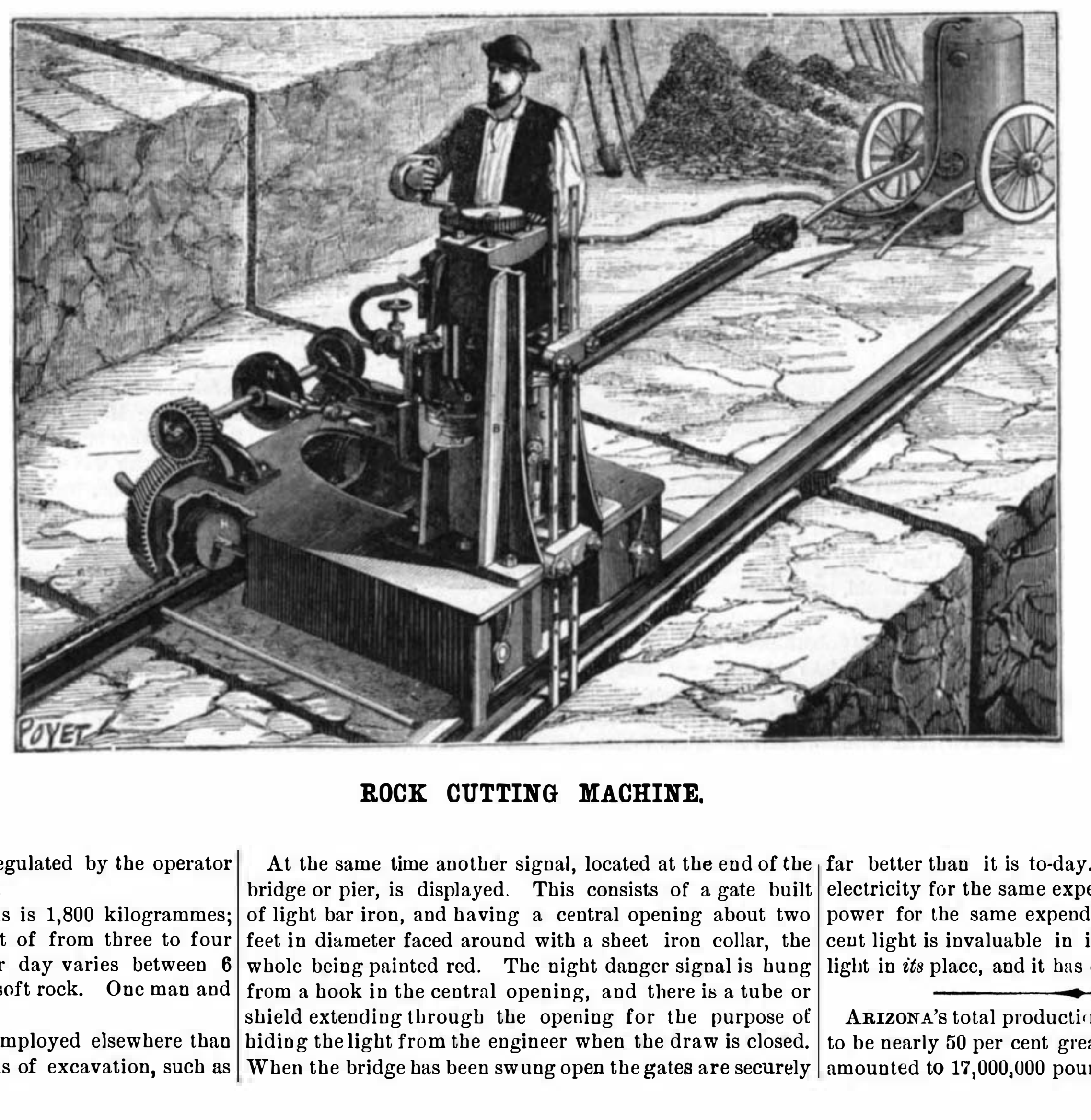
This machine, which is easy to maneuver and move about, appears to us to obviate all the inconveniences that we have just noted. It may be briefly described as follows: Upon a platform, A, are fixed two uprights, B, between which there are two cylinders, C and D, that are connected with a slide, against which the cutting tools, E, are fixed by means of pivoted supports, F. The steam, which is introduced through a pipe, R, is capable of giving the piston a velocity of 300 strokes per minute.

The steam cylinder, D, through a gearing formed of a wheel, S, and pinion, T, is capable of being moved vertically, thus permitting the cutting tools to work to a depth of 0·25 meter. In order to reach a greater depth, it is only necessary to unscrew the supports, F, and place the tool in the succeeding aperture.

The cylinder, C, contains air, which, through its sudden compression, forms a spring and prevents the machine from being damaged in cases where the cutting tools happen to meet with insufficient resistance. By means of an ingenious mechanism, each stroke of the piston gives the machine a to-and-fro motion, whose extent may be regulated by the operator according to the nature of the rock.

The total weight of the apparatus is 1,800 kilogrammes; the steam power required is that of from three to four horses, and the work effected per day varies between 6 square meters in marble and 20 in soft rock. One man and a boy assistant suffice to run it.

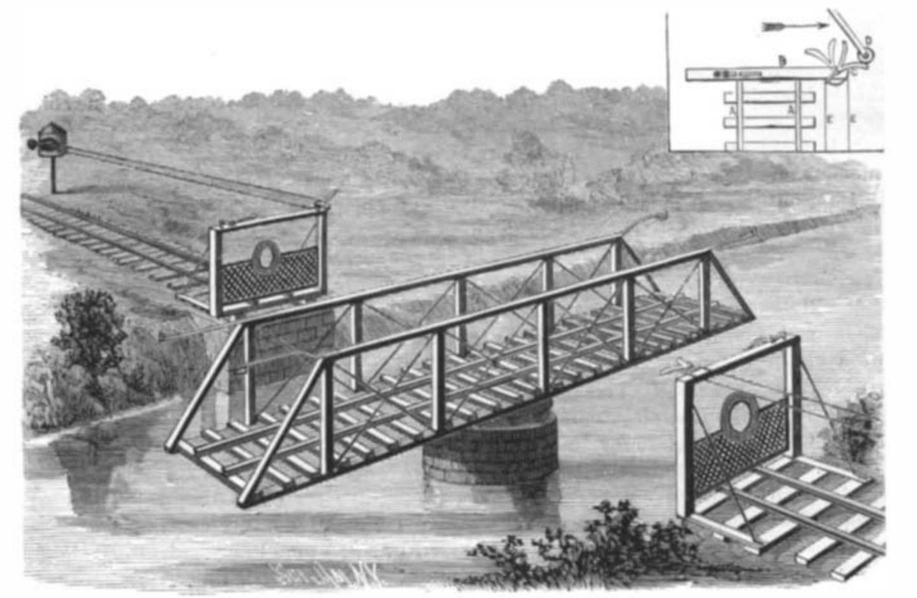
Mr. Rapp's rock cutter may be employed elsewhere than in quarries, and serves for all works of excavation, such as digging trenches, large canals, etc. For this latter purpose it offers the great advantages of permitting of the use of dynamite without any fear of lateral caving, since an absolute break will always be made between the bank and the cube to be taken out.—*La Nature.*



ROCK CUTTING MACHINE.

DRAWBRIDGE SIGNAL.

The invention herewith illustrated relates to signals for drawbridges, and aims to prevent accidents either in railroads or common roads where the drawbridge is located, by indicating to approaching trains or vehicles whether the draw is open or closed, at such a distance from the bridge that the train or vehicle may be stopped in time, should the draw be open. This object is attained by a mechanism attached to the draw and the other standing parts of the bridge, and the action of which is sure and perfect. The bridge attendant has no control whatever over the attachments or signals, which are automatic in their action. The device is easy and simple to construct, and as castings are not essential an ordinary blacksmith could place one in position in a very short time. It would add but little to the weight of the bridge, and it could be attached to any drawbridge now built.



WILLIAMS' DRAWBRIDGE SIGNAL.

The distant signal is located from two to six hundred feet away from the bridge, where there is a small house for the signal, which is raised about ten feet from the ground. Wires are led from the bridge to this house, where they connect with the signal arm, upon which is a red ball about two feet in diameter; this constitutes the day signal, but at night the ball is removed and a red danger lamp hung in its place. The turning of the draw causes the signal to be swung out of the house at a right angle and within two feet of the passing train.

At the same time another signal, located at the end of the bridge or pier, is displayed. This consists of a gate built of light bar iron, and having a central opening about two feet in diameter faced around with a sheet iron collar, the whole being painted red. The night danger signal is hung from a hook in the central opening, and there is a tube or shield extending through the opening for the purpose of hiding the light from the engineer when the draw is closed. When the bridge has been swung open the gates are securely fastened, and so arranged that they cannot be unfastened, except by the turning back of the bridge to its original position, when the gates, being released, swing back where they properly belong. The distant signal may be dispensed with on bridges used entirely for vehicles.

Further information concerning this invention may be obtained from the patentee, Mr. James N. Williams, Scott Street, Mobile, Alabama.

The Economy of Arc Lighting.

So much has been said by interested parties to make it appear that the arc light, as applied to street illumination, is expensive and even extravagant, that it is eminently desirable to get at figures which grow out of actual experience, and learn the lesson which they teach. Fortunately, just such figures are obtainable from the city of Hartford, in Connecticut, where the arc light has now been in use for some time, although on a limited scale up to the present time. It should be premised that the electric light was first introduced into Hartford about a year ago, and that it has stoutly held its own, notwithstanding the violent and almost virulent opposition of the gas company, which has done its best to bring it into disfavor and disrepute, and to oppose its introduction at every possible point. At last its turn seems to have come, for the authorities are loud in its favor, and in deciding to very materially increase the number of electric lights, report that each light in use actually displaces *six and one-half* street gas burners, giving, at the same ttme, at least *ten times as much light.* Now, each street gas lamp costs the city $35 per annum, the lamps burning 326 nights in the year. Six and one-half of these lamps, at $35 per year, cost the city $227.50 per annum. On the other hand, one electric light, which displaces these six and one-half gas lamps, costs the city 65 cents per night for 326 nights, or $211.90 per annum, a saving of $15.60 effected by each electric light per annum. Supposing Hartford to use one hundred arc lamps in its streets—and it is certain that the number in use will be increased to that figure within a very few months—the annual cash saving by displacing 650 gas lamps will be over $1,500, *besides the cost of lighting and extinguishing*, and the light furnished will not only be ten times as great in volume, but of a far better and pleasanter quality.

It will naturally be asked how it is that in Hartford one electric light displaces six and one-half gas-burners, while it was reported not long since that in Boston each arc light replaced but three and one-half gas burners. The answer is that in Boston many gas lights were kept burning so near the electric lights that their flames actually cast a shadow on the sidewalk, and that, in perhaps a majority of instances, the electric lights were not so placed as to render the greatest possible service. Whatever the cause may have been, it is very certain that certain influences were at work in Boston to throw disfavor on the electric light, and that it was not difficult for those in authority to so "cook" the returns as to make the worse appear the better cause.

But the reports that come from Hartford are those of persons who, at the outset, were bitterly opposed to the electric light, but who now, seeing its numerous advantages and fully convinced by their own experience of its superior economy, advocate its general introduction for street illumination.

For ourselves, we can say that we have never for a moment doubted the permanent use of the arc light for all purposes, including street lighting, where large spaces are to be illuminated. As we have already said, ten years hence we expect to see ten and perhaps twenty arc lights in use in this and every city where one now burns, and we expect to see such improvements as will render it cheaper, more simple, and far better than it is to-day. We are going to get far more electricity for the same expenditure of power, and far more power for the same expenditure of money. The incandescent light is invaluable in its place, but so, too, is the arc light in *its* place, and it has come to stay.—*Electrical Review*

ARIZONA'S total production of copper this year is expected to be nearly 50 per cent greater than last year's yield, which amounted to 17,000,000 pounds.