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Contents:

(Illustrated articles are marked with an asterisk.)

THE NEW YORK GAS MONOPOLIES.

New York has, like most large cities in the United States, suffered from the extortions of gas companies until the public at last revolts against their impositions. The chartered privileges of these companies, the large capital necessary to the establishment of an extensive system of illumination by gas, and the enormous profits realized in a few years, have made the monopolies so powerful that they have, as yet, defied competition. And although numerous companies have been projected, and some have been organized, the wealth of the older companies has been able to buy them up, or to effect coalitions, so that the monopolists have had their own way so far.

These companies have sustained prices far above that for which good gas can be made and furnished; but not content with this extortion, they have persistently furnished inferior gas without decreasing the price. They have been exceedingly arbitrary in their treatment of complaints, have treated with indifference those who questioned the accuracy of their bills, and have altogether made themselves so obnoxious to the public at large that every gas consumer will hail with delight any attempt to break their power.

For a period of about fifteen years, inventors have grappled with the problem of how to make illuminating gas from the light products of petroleum distillation. The task was not an easy one, and only through many failures has a fair measure of success been reached. There are now portable machines, for this purpose, in market that work very satisfactorily.

In Memphis, Tenn., there have been put into operation, on a large scale, works which manufacture gas from naphtha, and which are, according to the accounts that reach us, furnishing gas of far better quality than the ordinary coal gas, at a cheaper rate than the latter has yet been furnished to American consumers. We published last week an article referring to the quality of New York City gas, and need not enlarge further upon this head.

We are glad to learn that an organized effort to introduce here the system in use at Memphis is in progress, and that a company, composed of citizens among our heaviest capitalists, has purchased a site, and is erecting works on Avenue D, between 11th and 12th streets.

The company have a charter, granted at the last session of the State Legislature, which permits them to lay mains, to open streets, etc., and they are now vigorously engaged laying their main pipes in various parts of the city. It is further stated that at the ending session of the Legislature, strenuous attempts will be made to annul the charters of the old gas companies; but of this result we have not much hope.

The process used at Memphis, and which is to be adopted by the new mutual company here, is, so far as we have been able to ascertain its character, extremely simple, consisting in the conversion of the naphtha into gas by heat in retorts, and diluting it with atmospheric air to the proper degree for burning without smoking. Were it not that the process is stated to be a practical success, we should anticipate trouble in the distribution of such gas from condensation in pipes, which has been a difficulty experienced in the previous use of this material; but as a committee sent from this city to examine the process reports no such difficulty, we are constrained to hope it is in some way obviated. The committee report that the process is simple and safe; that the gas had a high illuminating power in all parts of the city, and that consumers state this power to average three times that of coal gas. It is expected that the new Mutual Company will have their works finished, and pipes laid so as to supply consumers early next season.

THE REPETITION OF EXPERIMENTS.

The importance of experimental investigation, so strongly insisted upon by Bacon and practiced since by scientists as the basis of the true scientific method in physical researches, is now so generally admitted as to need no argument. The importance, of not accepting results as final determinations of physical laws until repeated experiments leave no room to doubt their accuracy, is not so generally appreciated. The really scientific investigator always retains some reservation in his acceptance of results attained by others, unless, through the most careful scrutiny, he can find no error in their method of experimentation, and can devise nothing which appears a more sure way of arriving at truth.

The prestige of name and attainments goes far to influence belief, but those who think for themselves need a surer foundation than this in matters where accuracy is essential.

Libraries of reference contain tables which are relied upon by engineers and constructors in making their computations, and in the use of which they cannot go far astray; yet many of them have been found in practice to be inaccurate. At least, recent experiments have given results differing more or less from those formerly obtained, and from which the tables were framed. As long as differences exist greater than may be accounted for by inaccuracies in manipulation, there must remain doubt as to the correctness of our knowledge. Experiments upon any subject should then never cease until a certain degree of uniformity is attained through the employment of different methods.

There are not wanting recent illustrations of the truth of this proposition. Among these may be cited the remarkable experiments, of Professor Ogden W. Rood, of Columbia College, New York, on the amount of time necessary for vision, in which Wheatstone's conclusions from his experiments on the duration of the discharge of a Leyden jar, are found to be immensely far from the truth. He affirmed that the time necessary to produce distinct vision was within one millionth of a second. Prof. Rood now shows, by a most ingenious method, that in a space of time less than forty billionths of a second, the retina can receive and combine a whole series of impressions; and he feels confident that the eye could distinctly see an object illuminated during a period so inconceivably minute as four billionths of a second. In the conclusion of his paper on this subject, published in the *American Journal of Science* for September, 1871, he quietly remarks: "All this is not so wonderful, if we accept the doctrine of undulatory light, for according to it, in four billionths of a second, nearly two and one half millions of the mean undulations of light reach and act on the eye."

Professor Rood also has determined the possible duration, of the discharge from a Leyden jar, to be as short as nineteen hundred-millionths of a second.

Even the experiments of Regnault have been recently revised by Mr. Alexander Morton, with results from which he deduces formulae that show the relation between the temperature, pressure, and density of steam.

Recent experiments have shown room for doubt as to the full reliability of the tables in common use for computing the strength of beams and girders.

Boiler explosions are now being brought under systematic experiment, at Sandy Hook, which will doubtless throw much light on this important subject.

In short, there yet remain many things in science and mechanics to be definitely determined. The experiments of General Morin on friction might be revised, we think, with profit, and carried further than he went with them, to show how the compounding of motion on cylindrical surfaces modifies friction, and what part of the power is absorbed by friction in each of the components of the resultant.

The use of air compressors has shown that we are far from knowing the real laws of the friction of gases in tubes; and herein is a most important and profitable field of investigation, as the use of air as a motive power in mines and tunnels is only in its infancy. But we have said enough to show that, notwithstanding the labors of those that have gone before, there is yet enough scientific work to be done.

THE CONDEMNATION OF THE HALL OF PUBLIC RECORDS FOR THE CITY AND COUNTY OF NEW YORK.

In the Court of General Sessions, December 5th, Judge Bedford presiding, the Grand Jury made a formal presentment relating to the unsafe and filthy condition of the above building, a condition which, we believe, we were the first of the New York press to notice publicly.

In view of this decided action, it will probably interest our readers to know in what way important records of untold millions are kept (or rather not kept), as ascertained by a personal inspection of all parts of the building.

The building stands by itself in the northeast part of the City Hall Park, but not so far removed from other buildings as to be protected from fire by its isolation, unless it were thoroughly fireproof. Sparks would find easy access through numerous broken panes, only a portion of which were, at the time of our visit, stopped with books labeled "conveyances," newspapers, or whatever other makeshift could be extemporized by the clerks to keep out wind and rain.

Entering thus, the sparks would find sport ready to hand in loosely folded and dusty, cobwebby papers, which crowned the tops of nearly all of the cases, and in bundles of paper, loose shavings, small pieces of lath, etc., etc., which, dried by long protection from weather, are profusely scattered in the upper unoccupied rooms left in an unfinished state by the carpenters and masons.

The cases for containing the books of conveyance and records of mortgages are most perfectly designed fire traps. They are double, so that books are placed in them from both sides, the partitions which separate the books being boarded on their inner edges, leaving a wooden flue the whole length of each case, and about six inches wide, running from bottom to top, and open above and below.

No walls of any railway round house can exceed in grimy squalor the walls and ceilings of the Hall of Records. They look like chimney flues. One of the clerks told us that, during a term of fourteen years service, he had never seen a whitewash brush in the building. Leaky soil pipes and fetid sinks lend odors to the air, which is so sickening in some parts of the building that, we were told, some of the clerks have been made ill by it.

The numerous paper stuffed holes and crannies form a favorite haunt for troops of mice that, in the absence of other food, gnaw at the leather of the bindings to get at the paste and gum, and destroy the papers and maps without let or hindrance. We did see one or two tin boxes designed to spoil the literary recreations of these rodents, but the great mass of documents are entirely open to their ravages. In one place we were shown a great pile of what once were maps, thrown in a confused heap together, the mice having so disfigured and torn them that they are rendered illegible. In other places ledgers were reduced to mere bundles of unbound and displaced pages by the same destructive vermin. Everything spoke of ruin and rottenness. But sadder than all, the destruction and decay visible in the records and in the building were the evidences of the moral decay and the misrule which has so long corrupted our city government, and which has thus carelessly and criminally neglected public interests, and failed to provide for the security of the public records. We trust that, as we are now emancipated from this reign of disorder, the action of the grand jury will lead to measures that will so place public documents that they will no longer be food for mice, nor remain likely to become a prey to the first severe fire that shall take place within a hundred yards of the building where they are kept.

A MARE'S NEST---MORE ABOUT THE GAS QUESTION.

In another column will be found an editorial containing the announcement that gas works are in process of erection on Avenue D, between 11th and 12th streets, by the Mutual Gas Light Company, to supply gas made from naphtha. A correspondent in the New York *Herald*, of Dec. 4, states that the gas to be supplied will be compounded of naphtha vapor, common illuminating gas, and atmospheric air. He sounds, (to the uninitiated), a fearful warning that a gas thus composed is "as explosive as gunpowder or nitro-glycerin, and far more terrible in its effects." He further says:

The dreadful disaster of the *Westfield* excited the just indignation of the public, but this calamity was only a faint intimation of what may be expected if this compound is allowed to be made. The oxygen necessary for its combustion is mingled with the gas not only in the holders, but also in the supply pipes; and if an explosion should occur it would take place instantaneously, throughout the entire body of the gas not only in the holders but also in the pipes in all parts of the city wherever they are laid, and every building in the vicinity of these pipes would be blown into atoms instantly, and every human being therein or near by would suddenly perish.

The destruction would be more terrible than an earthquake or the explosion of a powder magazine.

Now, mark, it will be claimed by those interested in this death process that it has been in successful operation in Saratoga and other places, and that no accidents have occurred from its use. Well, the Saratogians have been truly fortunate in escaping a terrible calamity; but let this compound be ignited by the breakage of a street main, or in any other of the thousand ways that may happen any moment, and if the result is not more terrible than here indicated, then it will be because Providence interposes a miracle to save the people.

A year or two since a new gas burner was invented for burning a mixture of coal gas and oxygen gas. This burner was denominated the "safety burner." It was tried and worked well for months. No accident occurred until a defective burner was used, when an explosion took place. There was not more than one cubic foot of the mixed gases in a small holder, when the accident occurred which sent part of the holder down through two ceilings and the other part upwards through one ceiling and the roof of a building in Broadway, producing a frightful noise and great consternation among the people in the block. Thousands were attracted to the scene of the accident in a few moments. Now, this mixture, so far as its explosive properties are concerned, was precisely the same as that proposed to be made by the Mutual Gaslight Company and supplied to consumers.

All of this terribly sensational statement is pure, unmitigated bosh, having no more foundation in fact than the stories of Munchausen or Gulliver. It is calculated to frighten those ignorant of the subject, and to injure the Mutual Gas Light Company. The statement, that the naphtha gas is the same mixture as that which exploded on Broadway, is without truth. Any kind of combustible gas will explode when mixed with enough air or oxygen to entirely consume it. The explosion, cited by the *Herald* correspondent, was with coal gas and oxygen so mixed, as is always the case when coal gas and oxygen are used in the so called magnesia, or lime light. The mixture is ordinarily made with minute quantities of the gases, just before they reach the pencil of lime, or magnesia, which in their combustion they heat, and render luminous. It has long been known that common illuminating gas, mixed with common air in the proper proportions, will explode, yet when conveyed in pipes it is so impossible that such a mixture can occur in the conduits, that gas is acknowledged the safest illuminating agent in use. The explosions that have occurred with it have been caused by its escape into closed apartments where, after a time, the proper proportions of gas and air have been mingled, and subsequently ignited by contact with flame, through carelessness.

When any illuminating gas is mixed with air in sufficient

quantity to render the mixture explosive, it loses its illuminating power, and burns with a pale blue flame. A gas, that will give a light from any ordinary sized burner sufficient to read by, is never explosive. The Mutual Gas Light Company propose to furnish *illuminating gas*, and if they do this, they will furnish a material as safe as any ever employed for lighting; for the same general principles apply to all kinds of gas from which light is obtained.

But it may be asked, why has the SCIENTIFIC AMERICAN made such a persistent protest against the use of naphtha in naphtha stoves and in lamps, if the material can be used as is proposed by the Mutual Gas Light Company? We answer that naphtha, so long as it is in a liquid state, can never explode. So long as it is confined in close pipes, it can never burn, whether it be in a liquid state or in a gaseous form. When not controlled as it can be in metal pipes, it may and does often generate vapors that, mixed with air, are explosive. When lamps are broken or overturned, a highly inflammable liquid is scattered about, which endangers life and property. The dangers arise from the careless and wrong methods of using this material. A lamp is no more a fit instrument for burning naphtha than is a man's watch pocket for the burning of gunpowder. Experience has shown that inflammable gases may be conveyed in pipes with very great economy and safety; and when the false prophet of the *Herald* cites, as an example of danger, an instance where coal gas exploded when mixed with oxygen, he, like other over eager witnesses, proves too much. He proves that gas, (which, rightly mixed with a supporter of combustion, will explode), can be and has been used for years with less damage than has arisen from any other mode of illumination. The same can be done with the naphtha gas, the safety arising in both cases from the manner of distribution through pipes.

The article in the *Herald* is evidently written by a person not ignorant of the facts and principles we have stated, but one who, out of his knowledge of the subject and his acquaintance with the general ignorance of the public in such matters, has seen his opportunity to frighten the people, and retard the new enterprise which is likely to become a strong competitor with the old gas companies.

EDUCATION OF THE EYE.

How few there are that appreciate that optical marvel, the eye! How few understand its mechanism, the principles on which it acts, and the wonders it accomplishes! As an avenue by which external impressions find their way to the mind, it is worth all the others man possesses. So gradually is its skill acquired, that we hardly recognize it as acquired skill. We educate, through long and systematic practice, hands, feet, and muscles; but in the main the eye is left to itself, to acquire as it may its power of estimating distance and size, color and the definition of form.

In this desultory way it acquires a skill beyond expression wonderful, yet we believe that with most the power of vision is only imperfectly developed. What is to hinder systematic discipline of the eye any more than that of any other organ? To be able to see correctly is of as much importance to the mechanic as to the artist. Mr. Ruskin in his admirable treatise on the "Elements of Drawing" lays particular stress upon teaching the eye to see correctly, and shows that the hand will have but little difficulty in learning to represent what is accurately seen.

The mechanic is often called upon to make forms for which his unaided eye must be the principal guide. The wagon maker may lay out his work by patterns, but the ornamental finish principally depends upon the nicety with which his eye can trace lines of grace and beauty. Even in shaping a boot sole there is required great skill of eye. If any one doubts this, let him try to shape a sole to the outlines of his own foot, and see what an uncouth, ungainly form he will make. None but novices will try the experiment, for any one who has tried it, knows the difficulty of combining comfort and beauty in a boot sole. Shoemakers have been much denounced for their failures in this respect, but the reader may rest assured that their art is a difficult one. They can not go by plumb line, square, and level, like the mason or the carpenter, and no one who has never tried to draw a sole pattern knows how slight variations will affect, favorably or unfavorably, its appearance. The cabinet maker, the carver, the sign painter, the decorator, all of these attain skill principally through the education of the eye.

An analysis of what the eye can perceive will give a clue to the proper method of educating it. The impressions gained through this organ may be classed under the categories of distance, size, light and shade, form, and color. It appears to us that, in the order in which these categories are named, the education of the eye should proceed, since that is probably the order in which we first learn to perceive. It is through the power to appreciate distance that we form our first estimates of size; then we begin to distinguish light and shade, and thus to gain power to define form, and lastly we distinguish, more or less perfectly, colors and tints.

We think a most profitable system of exercises might be devised by an ingenious teacher, calculated to train the eye in the exercise of its various functions in early youth, and to form correct habits of vision; for he who supposes the eye is not influenced by habit as well as any other organ makes a serious mistake.

The worst habit of all is the habit of partial sight. Instead of closely scrutinizing everything they see, the majority of men only superficially look at objects as they pass before them. They thus become inaccurate witnesses in courts, inaccurate in their impressions of material objects in general, and fail when they attempt to imitate, because the images they strive to reproduce are imperfect.

If in early youth, children were taught to look carefully at everything, and to constantly test the accuracy of the perceptions thus obtained, we believe the habits of close observation thus acquired would be of greater advantage than the result of any other mode of discipline now practiced in elementary schools.

THE ST. GOTHARD TUNNEL---ANOTHER GRAND ENGINEERING WORK.

The pass of St. Gothard was the most frequented of all the routes across the Alps until the commencement of the present century; but as it was not practicable for vehicles, it was gradually deserted after the construction, by Napoleon I., of the road over the Simplon. The loss of traffic induced the cantons through which the route passed to construct a carriage road quite as good as that on the Simplon. The work was commenced in 1820, and finished in 1832, and it is one of the greatest monuments of engineering skill to be found in Europe. In magnificence of scenery, the St. Gothard is superior to all of the passes, unless we except the Stelvio. To the mere pleasure seeker, it will, therefore, be a matter of regret to see this superb road deserted for a hole through the mountain. Ever since the Mont Cenis tunnel was projected, the Swiss and Germans have felt that a large share of traffic would be diverted to France. For military and strategic reasons, it was, also, felt that equally good facilities ought to be provided on the other side of Switzerland, and all of the necessary surveys were made many years since; but the jealousy of the French, and the fear of that nation, has prevented the commencement of the work. The moment, however, that France was powerless to prevent, the project was revived, and we now hear that a contract for the construction of the tunnel has been concluded between the Swiss government and a syndicate of German bankers under the protection of the imperial government of Germany. The work will be about twice as long as the Mont Cenis tunnel, and it will be considerably more difficult, as it must pass under several rivers and lakes, and encounter the hardest rocks of the Alps. The summit of the present carriage road is 6,507 feet, but the railroad will pass under peaks varying from 8,750 to 10,900 feet. There is no distinct peak of St. Gothard, but an extensive ridge of elevated ground which bears that name.

Geologists will be greatly interested in the work, as this part of Switzerland abounds in a large variety of choice minerals, and some important questions may be solved by the projected work. The total cost is estimated at $37,000,000. Of this amount, the company will raise $20,000,000, leaving the balance to be raised by assessment upon the cantons and countries immediately interested in the project. There is a general belief among engineers that the work will cost much more money than the above estimate, but, as rich governments stand as security, there seems to be little doubt that the undertaking will be pushed to final completion. The new road will bring Germany and Italy into closer political union, and, in the event of war, give these powers a decided military advantage; but this feature of the undertaking is of small importance in comparison with the enormous traffic that will flow through the tunnel between the nations of the North and the remote inhabitants of Asia. Its principal utility will consist in facilitating trade and travel between Europe and Asia, by way of Italy The extreme Eastern points within its circle of traffic will touch the outstretched hand of our Pacific railroad, and the commerce of the whole world will be benefitted by the completion of the gigantic scheme. It is not many years since the river Danube was the highway for the commerce of the world. The boats, moored at the bridge of Ratisbon, far up in the interior of the Continent, were manned by sailors who were the boast of that period, when suddenly, by the discovery of the passage around the Cape of Good Hope, commerce was diverted to new routes, and we have nothing but the ancient bridge and the quaint old storehouses to tell us of the magnificence of the past. The completion of such works as the Suez Canal and the tunnels through the Alps are great illustrations of the triumph of science over all obstacles.

The trade, which, for a time, was diverted to new routes, appears likely to return to its former channels. The Austrian government already have a railroad over the lower Alps, connecting with Trieste and Venice, so that they will profit by the revival of trade in this direction.

It is difficult to anticipate how long it will require to complete the St. Gothard tunnel, but, with improved machinery and aided by the experience of Mont Cenis, it can hardly endure twice as long as the last famous undertaking. It is a bold enterprise, well worthy of the age in which we live.

A MOST INGENIOUS MACHINE.

There is on exhibition at the Progress Iron Works, 59 Lewis St., this city, a machine, for bunching, wiring and inserting and fastening bristles in brush backs, that is a marvel of ingenuity. In the accuracy, beauty and rapidity of its operation, it has scarcely been excelled in the history of invention. The machine was entered at the Fair of the American Institute only just before the closing, and it escaped notice from us at the time on that account. We shall, however, shortly give an illustrated description, which will be more satisfactory to our readers. The machine is, we believe, the joint invention of Messrs. O. D. and D. C. Woodbury, of the above named works. To any who like to see what mechanical skill of the highest order can accomplish, it offers one of the most profitable studies that has been brought before the public in a long time, and it must, we think, revolutionize the present system of brush making.

MECHANICAL BIGOTS.

Bigotry is by no means confined to religionists, any more than pedantry is limited to schoolmasters. The good old way, whether it be in science, art or mechanics, is *so* good, in many men's eyes, that to them there can be nothing better. To them, innovations and innovators are abominations. Because unwilling to adapt themselves to a new order of things, and reluctant to make the effort, they are sure to be left behind in the race. Instead of "trying all things and holding fast to that which is good," they hold fast to that which they have, and try nothing.

The other day we carried a lock to four different locksmiths, for repairs. In itself peculiar (we believe it was imported from France) and being attached to an article in such a way that it was impracticable to substitute for it another lock, it proved too much for the ingenuity of the mechanics who were solicited to mend it. "*It can't be done*," was the unanimous verdict. In each case, we delicately suggested a method whereby the repairs could, we thought, be easily effected, and in each case we were met with an impatient assertion that the suggestion could not be put into practice. At the fourth shop we lost patience and offered, with the aid of a few simple tools, to convince our mechanical bigot that "some things could be done as well as others." It took us about a quarter of an hour to prove our position correct, and put the lock into good working order. We silenced this bigot, but did not reform him. The next time he is asked to do something out of the usual way, he will be just as pig-headed as before.

We once had a similar experience with a pattern maker, who declared patterns could not be made to cast a certain article, which could be drawn from the sand; yet that same impossible feat was accomplished by the bigot himself, finally induced, by some stinging remarks, to get out of his rut.

This sort of wilful blindness, is quite a different thing from that intelligent conservatism that, after carefully examining new things, refuses to adopt them, because they are no improvement on those already in use. Heaven only knows what the world would come to, were there not such a thing as intelligent conservatism. But the latter never says things are impossible; it simply says of that which it rejects, "it is unprofitable or impolitic." It places a wholesome restraint on that class of mind which believes that everything new must be useful, and is always eager to embrace that which has the charm of novelty. It calmly sifts the chaff from the wheat, and gives the former to the winds, whether it be old or new, while the wheat is saved; if old, valued neither less nor more than the new, on that account. Whatever is valuable is retained on account of its value, not on account of its ancient prestige, nor the brilliant *début* it may have made into the world of letters, science or art.

The bigot, on the contrary, refuses to examine, and prejudges everything which has not the stamp of custom to commend it. To merit his disapproval, any proposition or process needs only to be different from that to which he is accustomed. He refuses to acknowledge proof, and turns himself away from attempted demonstration. He does not see, because he does not want to see, and hence his blindness is total.

We find plenty of just such bigots among mechanics and engineers, although the tendency of these occupations is to correct such a state of mind; but prejudice is so strong, and reasoning so difficult, that the world will probably never be rid of those who prefer to shut their eyes, rather than hurt them by looking at the light.

IMPORTANT IMPROVEMENT IN GLASS AND PLATE ENGRAVING.

We have heretofore chronicled the invention of Tilghman, who, by means of a powerful blast of steam or air, impels a jet of sand with such tremendous force against the surfaces of glass, stone, or other materials, that they are cut, engraved, or dressed, as may be desired. In fact, stone may be bored by this process.

We have now to record another improvement in an analogous direction, although the means employed are far simpler, while the results produced are very remarkable. We allude to the invention of George F. Morse, 287 West Twelfth street, New York, for which a patent has been recently granted.

The inventor provides a simple box or hopper, from which depends a small tube about eight feet long. No machinery whatever is used. A mixture of corundum and emery, in the form of powder, is placed in the hopper and allowed to descend through the tube. The article to be engraved, which may be a silver cup, a watch case, a sheet of glass, a goblet, or other object, is held under the extremity of the tube, so that the engraving powder will fall upon it, and in a few minutes' time the most splendid ornamental designs are cut, with marvelous exactitude and surprising beauty. We have seen engraved effects, produced by this process, upon glass and silver ware, that altogether surpass anything that has ever been attempted by the most skilled hand labor.

As fast as the supply of the engraving powder runs down through the tube, it is replaced in the hopper; and girls may do all the work. That portion of the surface of the articles that is not to be engraved, is protected by paper or other substance. The engraving, therefore, is done by cutting out the desired pattern in paper, which is then applied to the surface of the article. The powder only acts between the interstices of the pattern.

This simple and beautiful invention promises to revolutionize the art of plate and glass engraving. By its use the adornment of all kinds of wares, in the most superb manner, may be quickly accomplished, at a tithe of the cost of the ordinary methods. The invention is now in successful practical operation in this city.