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Contents:

(Illustrated articles are marked with an asterisk.)

Action of Hydrogen on Oxide of Iron.....	261	Lissmann's Machine for Rolling Metals.....	257
A Light Unit.....	266	Marquard's Artificial Stone.....	265
An Example to Manufacturers.....	263	Master and Apprentice.....	264
A New Railroad.....	259	McGee's Collar Pin.....	259
Answers to Correspondents.....	267	Milk Statistics.....	261
*Apparatus for exhibiting the properties of Vapors.....	259	Music of Rolling Sand.....	257
A Remarkable History.....	264	Official List of Patents.....	262
Awful Fate of a Balloonist.....	262	Plants in Bedrooms.....	262
Balloon Ascension.....	257	Pringle's Improvement in Oars.....	267
*Baxter's Portable Steam Engine.....	258	Queries.....	267
Breadstuffs and Cotton Imported into Great Britain.....	255	Recent American and Foreign Patents.....	266
Breeding Silk Worms.....	262	Recent Progress in Metallurgy.....	263
Business and Personal.....	266	Scientific Intelligence.....	265
Change which Flour undergoes in Barrels.....	258	Sheehan's Patent for Steelifying Iron.....	266
Changing of Color in Fishes.....	264	Sinclair's Boiler Fire Extinguisher.....	266
Colorado Ores.....	256	Stick to the Fence.....	258
Coloring Gold.....	255	Testing Boilers by Hydrostatic Pressure.....	261
*Combined Sadiron and Stand.....	262	The Approaching Solar Eclipse.....	261
Curiosities of Life.....	256	The Great Fire at Chicago.....	263
Decline.....	267	The Hartford Steam Boiler Inspection and Insurance Company.....	259
Don't begin to Build in Autumn.....	257	The Pianoforte.....	257
Editorial Summary.....	256	The Psychic Force.....	260
Effect of Exercise on the Bodily Temperature.....	256	The Sunshine Patent.....	261
Facts about Butter.....	260	The Waterbury Watermeter.....	259
Fair of the American Institute.....	264	To take Bruises out of Furniture.....	256
Galvanic Experiments.....	260	To Transfer Ornaments for Carriages, etc.....	256
Ignition by Superheated Steam.....	251	To Violin Players.....	262
*Improved Railroad Chair Joint.....	262	Tunnel between England and France.....	266
*Improved Universal Woodworking Machine.....	255	Treatment of Colorado Ores.....	261
Inventions Patented in England by Americans.....	268	Use of Anglers.....	267
Liquid Measuring Can.....	261	Typhoid Fever Treated with Milk.....	258

THE GREAT FIRE AT CHICAGO. A NATIONAL CALAMITY AND A TERRIBLE LESSON.

While, from pulpit and press, has issued and is still issuing a flood of lamentation over the great misfortune that has befallen Chicago, and which is not her calamity alone, but a national disaster: and when eloquence and rhetoric have striven to give forcible utterance to the intense sympathy for the sufferers that pervades the civilized world: we can add little, by any words we may pen, to the public realization of the magnitude of the catastrophe, or to the universal generous impulse to extend efficient material aid to the homeless and bereaved; an impulse that has not expended itself in useless talk, but in prompt, noble, and openhanded munificence.

Our sorrow is sweetened by the pride we feel in these generous deeds, which go far towards restoring our faith in humanity, severely tasked by revelations, of fraud and dark doing, lately brought to light in our midst. There must be some good left in the world when such spontaneous and genuine sympathy for suffering is displayed.

Is there no useful lesson taught us in this dreadful catastrophe? The fire record of this country is one which may be profitably reviewed, in connection with this last crowning event, in the dark catalogue which eclipses all that has gone before. New York, Troy, Portland, and Chicago have so far been the cities doomed to feel the fiercest wrath of the fire fiend.

All these great fires occurred under a combination of peculiar circumstances. There had been long drought, and everything combustible was in the proper condition to burn with the fiercest rapidity. There were quarters in each of these cities in which the fire could feed itself fat on wooden structures whose combined burning generated a heat too intense to be withstood by walls of brick or iron. In each case, there was a fierce wind that blew the flames directly upon the heart of the city, and speedily forced the conflagration far beyond human control. In each case, it was seen that so called fireproof structures are not proof against such a combination of circumstances; that walls of stone or brick, with beams and columns of iron, alike succumb to heat of sufficient intensity, and that in structures made of materials that will not of themselves burn, there are usually stored goods that, in the ovenlike heat which warps, crumbles, and cracks fireproof walls, take fire and increase the power of the conflagration to destroy other similar structures.

The wooden sidewalks and pavements which abound in Chicago no doubt did much, in their excessively dry condition, towards spreading and adding fury to the flames; and it is stated that the fire ran along these streets to great distances, interfering with the work of the firemen, and rendering their efforts hopeless.

It is safe to infer from the careful general study of fires in cities, and the consideration of all the circumstances of the four great fires above alluded to, that, were it not for wooden buildings massed together in cities, there never could be such extensive conflagrations. It is in these sections of summer-dried wooden buildings that the fire first gets beyond the means of control. In them it gathers its intense power of destruction, which every new morsel it licks up increases, until finally glutted, or obstructed by a providential

change of wind or a heavy fall of rain, it falters in its work of ruin.

The ruin that has befallen Chicago awaits every city within whose bounds masses of wooden buildings stand, whenever a similar combination of circumstances shall arise.

The Brooklyn, Jersey City, Newark, and Paterson papers have been loud in their expressions of sympathy for the destitute of Chicago, and Brooklyn was among the very first to send a large sum of money to the sufferers. Let generous Brooklyn itself beware. It boasts that Chicago alone of all American cities has rivaled it in rapidity of growth. It may be that Chicago alone of all American cities can rival it in ruin. Nearly half the city of Brooklyn, as well as the other cities named, is built of wood. Some time will come the dry season, the fierce gale, blowing toward the heart of the city; and a fire, that under ordinary circumstances would be easily quelled, will spread into wide destruction.

After all these examples of the danger of massing wooden structures, it would seem we should learn wisdom. One third of a prosperous city now lies desolate; and, practically, its entire business, its means of recovering its loss, is destroyed. In this respect, as well as in the extent of area burned over, this fire has been more disastrous than any on record, except the great fire of London. It is no surface injury the city has sustained; she is hurt in her most vital part. She will recover, but for years will feel the effect of this blow. Regret is unavailing. We can only extend the hand of sympathy and assistance, and learn from her fate to avoid the danger that has proved the prime cause of her fall.

Among the many reflections that crowd themselves upon the mind, connected with this event, the evidence of the growing feeling of brotherhood among nations, is one that will not escape the notice of the thoughtful; and the means by which this feeling is nourished, will also be easily recognized. The news that Chicago was burning, reached London and Paris, and the chief European centers, only a little later than it was known in New York; and the telegraph wire that sent the sad news across the Atlantic, flashed back words of sympathy and cheer, and pledged assistance, which will soon reach its destination. "Pay to the order of"—pulsates along the cable, and a check is drawn in New York for Chicago. Truly, this is like shaking hands across the mighty waters that, fifty years ago, separated two continents by months. Rapid communication has done more to unite the interests of the civilized world than all other influences put together.

The total amount subscribed up to Wednesday night, the 11th inst., was over two and one quarter millions dollars, and probably that amount will be doubled before this paper reaches its readers.

These timely succors, together with the insurance—at least fifty per cent of which will, in all probability, be paid—will do much toward restoring the business of the city, which had, before this trouble, immense vitality.

The wooden buildings, sidewalks, and pavements will be replaced by more substantial structures, and, in time, the Garden City will perhaps be all the stronger for this purification by fire.

AN EXAMPLE TO MANUFACTURERS.

A correspondent writes from Berkshire county, Mass., giving an account of what has been done in the village of Housatonic towards elevating the condition of the workmen in the mills, and rendering their lot as comfortable, refined, and respectable as that of any class of citizens in the community. It is an example worthy of imitation on the part of all manufacturers, and we should hear less about strikes, shut outs, and combinations, if a similar consideration for operatives was everywhere exhibited.

The Owen Paper Company, of Housatonic, has been celebrated for many years. It was one of the pioneers in this branch of industry, and has established an enviable reputation for the superior quality of its manufactures and the honorable dealing of all concerned. It is not, therefore, necessary to speak of the paper made here, or to give a gratuitous advertisement of the products of the factory. Everybody has used the paper, and many years of successful industry is a sufficient public notice; but there is one feature of the mills, entirely disconnected from its business affairs, which is not known to the world at large, but which ought to be, for the good example it affords; and it is of this that our correspondent speaks.

The present owners of the property have purchased all of the land on both sides of the river for several miles, chiefly for the purpose of controlling it and preventing the approach of any element discordant with the general principles they have adopted in their conduct of affairs. The moment the stranger crosses the line of the property, he is conscious of the presence of a presiding authority, as the road is kept in admirable order, the fences are neatly painted, shade trees are judiciously planted, and little parks laid out; and in front of the mills, instead of litter and dirt, boxes, bundles, and confusion, there are neat gravel roads, grassy inclosures, clumps of trees, and such order as one generally only sees about the grounds of a wealthy country gentleman. This at once gives an air of refinement and civilization to the place, and prepares the visitor for the neatness and discipline that reign within the walls.

The process of the manufacture of paper is always an interesting one, but when it can be followed from the rags to the finished "cap," in an establishment kept as neat and orderly as the Housatonic mills, it is not alone the beautiful application of mechanical genius that attracts us, but the practical solution of the question of how a business can be carried on as a pecuniary success, and, at the same time, with a constant regard for the comfort of the workmen. It is a

place through which a lady could walk without fear of soiling her dress, even if she wore the unsightly train the sex affects so much under present fashions. The neatness of the place suggests the propriety, on the part of the visitor, of carefully removing all dust from his shoes before entering it. The appearance of the women engaged at work is entirely in keeping with the surroundings. They wear neat calico dresses, and have the air of being quite as refined and respectable as persons engaged in the more fashionable and aristocratic occupations of teachers, governesses, and the like. In fact, the woman question here meets with its proper solution. Women are enabled to support themselves, to lay up money, to carry their share of the burthens quite as respectably and independently as the men.

The company make more money, beyond a doubt, by having in their employ persons of such thorough respectability; and if it costs money to keep the place clean, to plant shade trees, and surround the operatives with refining influences, they more than get their return in the improved character of the work and the emancipation from discontent and strikes. All of the persons employed in the mills are provided with homes. Comfortable cottages, surrounded by gardens and flowers, dot the hill sides, and adorn the banks of the river. They are all handsomely painted, and vary in size and elegance according to the business responsibility of the occupant. Some of the higher officers occupy what might be called villas—really architecturally beautiful houses, such as any gentleman from the city would like to own as a country seat. For the unmarried women, there is a fine boarding house, with its cupola, piazza, and every modern convenience, conducted under the careful superintendence of a matron. It looks more like a boarding school for young ladies, than a place in which women live who work hard to earn their daily bread. Ample provision is also made for the education of the children. And in order that the religious instruction of the community should not be neglected, the company have built a handsome church, and contribute liberally to the support of the minister. There is a fine circulating library and reading room attached to the mill, absolutely free to all; and the character of the books on the shelves, and the good use made of them, is one of the most interesting features of the place. There are often five hundred volumes out at a time, some of them histories, some novels, some travels, and all capital reading for instruction or amusement. There is a librarian paid by the company, an intelligent woman, who is in attendance from 11 A. M. until 9 P. M., who cheerfully gives any information to her patrons, keeps a record of the books, and takes care of the place. Between 12 and 1 o'clock, the usual time for dinner, after partaking of that meal, clusters of the men and women can be seen entering the reading room, to look over the files of papers; and in the evening, the place, being warmed and well lighted, is often full of persons who come to consult such books and journals as cannot be taken home. Religious papers of all denominations, several of the monthlies, illustrated papers, and the leading scientific journals, are kept on file, and among them the SCIENTIFIC AMERICAN is a great favorite, if marks of frequent handling may be taken as a test. There are no grog shops or nuisances of any kind, and if any of the workmen show a tendency to visit such establishments, they are immediately furnished with a permanent leave of absence—their room is counted much better than their company.

At the time of the French Exposition of 1867, a reward was offered to the owners of the best conducted manufacturing establishment, taking into consideration the care of the workmen, the moral features of education, lodging and general deportment of the men. There were numerous competitors, and we do not recollect who won the prize, but it is evident that the mills now owned by Mr. Cone, at Housatonic, ought to have competed for the honorable distinction.

Much is said, in this country, about the dignity of labor, but most people act as if they had no faith in it. A successful mechanic rarely wants his son to pursue the same calling; he sends him to college, and, after college, to a profession, where he often learns ways that are decidedly unprofessional and unworthy of his father. It is not the labor that dignifies, but the character of the man that makes any honest work respectable; and when manufacturers take this view of the question, and surround their work by refining and elevating influences, so that no one need feel ashamed to be found at his task, they become real benefactors of their race, and are reformers in the right acceptation of the term. There is no dignity in labor, if it be conducted in a low and groveling way. There is nothing more dignified than labor, when carried on with a pure and elevated spirit. The example set among the hills of Berkshire appears to be worthy of study and imitation.

RECENT PROGRESS IN METALLURGY.

At the recent meeting of the Lyceum of Natural History, Professor Egleston, of the School of Mines of Columbia College, made a few extemporaneous remarks on the recent progress of metallurgy in Europe, whence he had just returned. The Professor stated that the Pattinson silver process was now almost entirely abandoned; and in its place had arisen, to great favor and almost universal adoption, the zinc process described in a former number of our journal. The advantages of the zinc process were set forth many years ago by Karsten, but, for some inexplicable reason, pronounced impracticable by the workmen who tried it. It was afterwards rediscovered and patented by Parkes in England, but then found no favor, and fell a dead weight in the repository of new inventions; finally, in 1858, it again raised its head, and, after many modifications and revolutions, has driven all other methods from the field. The old Pattinson desilverization is now chiefly confined to very poor ores, and

such as contain antimony. What is called mechanical *Patinage* is used at Stolberg, but the zinc method, employing steam and hand work, is now substituted for all kinds of ores, especially pyritous and blendes.

Another step in advance is the completion of the mechanical preparation works at Clausthal, commenced about eight years since. This immense establishment, more than 1,000 feet in length, is chiefly designed for silver leads, blendes, and the Hartz mountain deposits. It combines all of the latest improvements, and enables the government to economize all of the precious metals of that region, and serves for the education of a useful class of metallurgists.

Similar works have also been constructed at Ems, where the character of the ores is more in the yield of lead than of silver.

In the metallurgy of zinc, there has been a great improvement by the adoption of the regenerating furnace. At the extensive zinc works in Belgium, there is one furnace which runs 160 muffles, and the gas regenerating furnace has nearly everywhere superseded all other forms. In lower Silesia, they work ores of zinc which do not contain more than nine to ten per cent.

The economical use of iron slags has been pushed so far that Professor Egleston made the startling announcement that there are a good many furnaces on the Continent which actually sold their slags. The slags are either run directly into iron wagons or into water for granulation. They are worked up into cement and artificial building stones, are employed in chemical processes, especially the manufacture of alum, and are used to make crown glass where lime is required; and, in general, waste cinders are fast becoming a thing of the past.

The progress in steel manufacture has been very great, especially in the size of the pieces cast, and in mechanical contrivances for handling and working them. Twenty-five ton hammers are not uncommon. At Krupp's renowned establishment he was received with the utmost courtesy and shown everything. The great secret of the efficiency of these works is in the military discipline which prevails. The different gangs of men are marched up, deployed, and manoeuvred precisely like companies and regiments of soldiers; and there is no haste and no confusion, so that any number of crucibles of melted steel can be brought and poured out without any company coming in contact with another.

Krupp now proposes to construct a hundred ton hammer. By a new contrivance of reversing the rollers, heavy steam carriages are superseded, and the armor plates or rails go back and forth.

The ideas in reference to the construction of blast furnaces are much modified. They now build them without the massive outer coating, and sometimes exclusively of fire bricks, and much more open and accessible below.

In general, according to Professor Egleston, the progress of metallurgy in Europe has been very great within a few years, and he promised to present the chief points, for the information of the Society, during the course of the winter.

MASTER AND APPRENTICE.

The relation of masters to their apprentices may form a theme upon which a few hints may be profitably thrown out, although unfortunately, as we think, for the industrial interests of the country, these relations have changed very materially during the last fifty years. The old system of binding boys to a term of service, for which their reward should be largely in instruction imparted to them, has given way, in good measure, to the method of paying stipulated money reward for very limited terms of service, instructing the youths so employed only in some few details of a trade, and then getting as much as possible out of them for the money paid.

The result of this is that the proportion of really skilled workmen, when considered with reference to the aggregate number engaged in mechanical avocations, has greatly diminished; while many who are called machinists, boot-makers, or carpenters, are really only competent to run a lathe, to peg on a sole, or to shingle or clapboard a building.

There are, however, some shops which adhere more or less to the old apprentice system; and, whether they do or not, there still remain certain duties which masters owe to the youths employed by them, which, we fear, are often too much neglected.

While the full parental power of control, and the father's right to exact obedience, are, under the modern system of limited service, perhaps not to be considered as vested in employers, the duty to watch, with some care, the habits of boys, and to counsel and admonish them when likely to go wrong, is a duty devolving upon every master, and one which he ought not to shirk.

It is his duty, also, to judiciously praise and encourage all that he sees commendable, in their habits or handiwork, thus cultivating their self respect, and that regard for the opinions of others which forms in youth one of the most powerful stimulants to well doing, and one of the strongest safeguards to morals.

It is his duty to reprove when reproof is deserved, and to set such an example to others that his reproof will deserve and command respect. But his reproof should be so tempered with kindness, and an earnest desire for the good of the one reproved, that evil passions shall not be roused into violent opposition. It is his duty to instruct, not only in the elements of the calling upon which his apprentices are entering, but upon all matters of life experience, upon which his age and knowledge of the world have rendered him wiser than his young assistants.

How many masters throughout this great country are performing these obvious duties with fidelity? How many of

them can point to this or that young man who is going to the bar, and say, "My conscience is guiltless of neglect toward him?"

The dictates of common humanity, not to say Christianity, should prompt every master to watch, counsel, admonish, reprove and instruct, as seems necessary for the good of the young minds and hearts over which he has some measure of authority. The man who refuses or neglects to do this is neither humane nor Christian.

FAIR OF THE AMERICAN INSTITUTE.

ELECTRICITY.

Electricity, in one form or another, plays a prominent part at the exhibition this year.

RHUMKORFF'S INDUCTION COIL.

This wonderful instrument is exhibited by the Stevens Institute of Hoboken. Its length is 40 inches, high 18½ inches, and it weighs 166½ pounds. The primary wire is 200 feet long, while the secondary wire is 234,100 feet, or about 44½ miles. The battery employed to charge it consists of three glass jars, 10 inches diameter and 12 inches high, into which are lowered, by a windlass, fifteen plates of zinc and fifteen of carbon, each 6×9 inches. The exciting liquid is the usual mixture of bichromate of potash and sulphuric acid. With the above battery freshly charged and immersed 1 inch, the coil freely gives sparks 21 inches long in air, and white Leyden jar sparks 14 inches long; and the spark can be made to penetrate glass 3 inches thick. This performance has never been exceeded by an induction coil, and it is satisfactory to know that it was constructed by our countryman, Mr. E. S. Ritchie, of Boston. A few years since, the coil belonging to Columbia College, also made by Mr. Ritchie, was carried to Paris by Professor McCullough, and shown to Rhumkorff, who was so much astonished at its superiority over anything that he had ever constructed, that he begged permission to dissect it. This permission was granted, and he found that Ritchie's insulation and manner of winding the wires was superior to his own, and he adopted the American form.

It is generally admitted by physicists that Ritchie's contributions to our coils have been of great value, and that he has built several instruments superior to any of European manufacture. The performances of the monster coil are highly suggestive of a severe thunder storm, especially when the Leyden jar is filled and discharged in rapid succession. The effect of these discharges is to fill the air with the odor of ozone, and it is a question whether the instrument could not be used, as a convenient generator of this form of oxygen, on a sufficiently large scale to be employed as a bleaching agent in the arts.

BURGLAR ALARM.

There is the usual ringing of bells and perpetual din made by the opening and shutting of doors, to which the wires are attached, while the efficacy of this system of security against unwelcome visitors is set forth by the inventor or his agent. The plan of having the bells continue to ring until the connection is broken by some one in the house, is a capital one; and, if a bell on the street could be rung at the same time to attract the notice of the police, the rogues would be apt to vacate such premises, as being too uncomfortable for quiet work.

ELECTRO-PROPULSION MOTOR.

This is the name given to an invention for working sewing machines by magnetism. To the end of a long lever are attached two iron armatures, and, by an ingenious pole changer, the magnetic force is made to operate first on one side and then on the other; and, as the lever oscillates, it turns the crank of the wheel which is to do the work. The inventor uses four large cells of a Bunsen bichromate and carbon battery, to charge the magnets. The novelty of the adaptation consists in the manner of applying the pole changer, in the cup shape of the armature, and perhaps in the peculiar form of lever.

The circular which was handed to us, says: "This apparatus can be applied for propelling sewing machines, as now on exhibition; also other machinery and street cars—as any power desired can be obtained by magnets." There is considerable truth in the latter part of the claim, as the magnets of our city can testify; as to the power of magnets to propel "street cars and other machinery," there appears to be some difficulty, as it has never been successfully accomplished. There is a small locomotive, driven by magnetism in another part of the building, but this moves in such a weak timid way, as to suggest a break down the moment a load is attached to it.

Of the Electro-Propulsion Motor, the circular further says: "It dispenses with the use of the feet, which, in the opinion of the medical faculty is so injurious." We agree with the medical faculty that it is injurious to dispense with the use of the feet, and are decidedly in favor of plenty of exercise. If it is true "that the apparatus can be prefixed to any kind of machine," we are likely to see much of it. It will be necessary, however, for the inventor to employ a more economical and convenient form of battery, before he can expect to induce many private individuals to try the new motor.

PHOTOGRAPHS OF MAGNETIC FORCE.

A beautiful application of photography, to the illustration of physical phenomena, is shown by Professor Mayer, of the Stevens Institute, who exhibits plates of the diagrams, formed by magnetic force, very much resembling the sound pictures, so long familiar to the students of philosophy.

Professor Rood made photographs of the electric spark in a manner somewhat similar to this, an account of which was published in *Silliman's Journal*.

Putting electricity and magnetism on paper is one of the best ways in which to study these phenomena, and is a feature in modern research.

ELECTRICITY APPLIED TO MEDICINE.

The number of pieces of apparatus for the use of the medical practitioner, shown in the Fair, is unusually large, and indicates greater attention to this branch of therapeutics than formerly. Some of the contrivances would be highly prized by teachers in our schools, if they were better known, and could be had of dealers in philosophical instruments. We have to note particularly cauterizing instruments, an improvement on Stoehrer's induction apparatus, a universal platina zinc battery (which would be an admirable thing for professors of physics, if they knew about it), and a battery for galvanocaustic, exhibited by Curt W. Meyer; to this list, must be added the electro-medical generator of Professor Steele, and the portable machines of the Galvano-Faradic Company. The electromagnetic machine of the latter company is highly commended by some of the best physicians in New York, and, from the cursory examination we were able to make of it, we are disposed to cordially unite in calling attention to its efficiency, convenience, ingenious adaptation to a variety of uses; portability, endurance, and simplicity. While it is specially constructed for the use of the medical profession, it has many points to command the attention of all persons who may have occasion to employ induced currents for any purpose whatsoever.

GALVANIC FLUID.

There are so many fluids that can be employed in galvanic batteries, that it is difficult to see how any one of them can be patented; and, after they are patented, we should suppose that most persons would prefer to know what they were using, rather than to blindly follow a prescription. This reminds us that we found one exhibitor who bought his bichromate of potash, at a high price, already in solution, under the head of a "yellow liquid," without knowing what it was. We suggested a saving of fifty per cent, by using the dry salt and Croton water.

OTHER APPLICATIONS.

We do not refer to the telegraph, as that has become an old story. Nickel plating, which a short time since, was uncertain, now comes out brighter and more durable than silver. Aluminum plating is yet to come, but can hardly rival the pure white of nickel. Galvanoplastic is represented in a few groups, and indirectly in ornamental decorations of machinery. It would have been instructive to the public to have had the whole process of electrotype deposit illustrated and explained.

Electric clocks, with self feeding battery, and bank alarms, were on exhibition, and there may have been other pieces, of apparatus in which electricity played a part, which escaped our notice. We should have been glad to see a good thermo-electric pile, a cheap ozone generator, a large Ladd's magneto-electric machine, a meteorograph, alarm thermometers, electric pianos, engraving by electricity, electric car brake, Caselli's telegraph for sending autograph messages, electric lights, electric safety lamps, and a suite of galvanic batteries, such as we have seen at exhibitions in other countries. Much more has been done in the line of the application of electricity to the arts than is commonly supposed, and it would be of great use to the community could all of the contrivances be collected into one exhibition for comparison and study.

BULKLEY'S PYROMETER.

In our recent notice of this invention, we gave the address of Mr. H. W. Bulkley as 10 Barclay street; it should have been 98 Liberty street, New York city.

A REMARKABLE HISTORY—A TRUE STORY THAT IS STRANGER THAN ROMANCE—HOW MISFORTUNE WAS CROWNED BY SUCCESS.

In 1858, Mr. Thomas Sheehan, now as well as then of Dunkirk, New York, foreman in the blacksmith department of the Erie Railway shops at that place, patented, through the SCIENTIFIC AMERICAN PATENT AGENCY, a submarine grapple, which, though an ingenious invention, proved to be one for which there was little demand.

This was his first invention; and the cost of its completion, together with one year's struggle to manufacture and introduce it, completely exhausted Mr. Sheehan's means, and reduced him to the extremest poverty. Now Mr. Sheehan, though not fortunate in inventing, making, and selling submarine grapples, had, in conjunction with his good spouse, been eminently successful in increasing his family, which comprised eight children at the close of the year of struggle above mentioned.

Eight children, and an empty larder, are rather stern facts when a father is called upon to meet them; and in this case our inventor's troubles were increased by the not unnatural complaints of his wife, who accused him of having left a good situation to pursue a chimera, thus reducing his family to pauperism. In fact, the good woman was decidedly bitter, and her acerbity, added to the really desperate condition of Mr. Sheehan's finances, produced in him a mental state under which some men would have permanently gone to the bad.

Not so our inventor. He kept a stiff upper lip, and sought long and anxiously to provide support for the hungry mouths that appealed to him for food.

It did not subtract from the trouble of this critical period in Mr. Sheehan's life, to discover that his failure had been due, in great measure, to the derelictions of a partner whom he had taken in with him to aid in conducting the grapple business, and who he found had taken undue advantage of his position, selling wares for which no returns were ever made to the firm, and otherwise misconducting himself.