5. The system of automatic transmission by the use of metallic type, or of the embossed paper strip from the register, as a means of opening and closing the circuit.

6. The use of a printing wheel and ink as a mode of recording, generally known as the "ink writer."

It must be admitted by the unprejudiced reader that, in the report under consideration, Prof. Morse has, in most cases, brought forward sufficient and satisfactory evidence of his having been the inventor of the apparatus and devices above named. In regard to the electro-chemical system of recording and the mode of transmission by the embossed paper strip from the register, although very probably first suggested by Prof. Morse, they do not appear, by the evidence, ever to have been put in practical form, and this fact, therefore, in our opinion, does not detract from the credit due to Bain, who made the electro-chemical system a practical reality, or from that of Edison and Westbrook, who, at a more recent date, independently invented and put in operation, unknown to each other, modes for transmitting, by the embossed paper strip, which, although upon the same general principle, differ widely in the details of their construction.

The line of argument which has been adopted by some writers upon this subject—that of resolving the invention into its elementary parts, and showing that each detail was before known, and that, therefore, no credit was due to the man who combined them in such a manner as to produce a new result—is an exceedingly unfair one. Almost every great invention is a combination of devices previously well known, and, indeed, it is almost impossible that it should be otherwise.—*The Telegrapher*.

For the Scientific American.

ON MANGANESE AND SOME OF ITS COMPOUNDS.

BY PROFESSOR CHARLES A. JOY.

It is difficult to trace the origin of the word manganese, the ores containing it were variously styled female magnets, black magnesia, alabandicus, from the City of Alabanda; mangadesum by the glass makers, and later manganesium, and finally manganese. But notwithstanding the antiquity of the name, it is safe to say that even at the present time very little is known about the properties of the metal, and it is for this reason that we have chosen to speak of it, in order to put together for convenience of reference, the various methods of its preparation, and the properties of the metal as accepted by the best authorities.

For a long time iron and manganese were confounded together, but after the Swedish chemist, Gahn, proved the existence of a new substance in the mineral pyrolusite, the analogy between the new metal, manganese, and the old metal, iron, at once suggested that the former could be reduced in the same way as the latter.

The oxide of manganese was heated with charcoal, and a complete reduction followed. The heat required was the same as that for the reduction of iron. The metal obtained in this way, like pig iron, was found to contain considerable silicium and carbon, and to be very brittle. Whether it could be made malleable by burning off the carbon and squeezing out the silicium in a puddling furnace has never been ascertained, as no one has ever manufactured sufficient metallic manganese to make the trial. If the first chemist who reduced an ounce of iron from the oxide by means of charcoal could see to what uses the brittle, easily rusting, unmalleable metal as described by him, is now applied, he would be slightly surprised, for in small quantities or in the form of powder, every chemist would be forced to say that iron would have to be kept hermetically sealed, or protected by naphtha from the action of the air. It may be that manganese in larger quantities and properly refined, purified, and annealed, would be capable of being hammered into thin foil or drawn into fine wire, but at present we have no positive knowledge on the subject.

Another method for the reduction of manganese is to fuse the chloride with an equal weight of fluor spar, and one fifth its weight of metallic sodium. When obtained in this way it has the color of cast iron; is very brittle and very hard. It will take a fine polish, cannot be scratched by a file, cuts glass easily, does not change in moist air, is not attracted by a magnet, and has no effect upon the magnetic needle; it cannot be wrought, but can be cast the same as iron, and its specific gravity when prepared in this way is 7·16.

This method has been severely criticised by our best chemists, and it has been objected that the metal obtained was in no way pure, and ought not to be accepted as disclosing the true properties of manganese.

Deville fused the metal to a crystalline mass, the powder of which decomposed water rapidly; its color very much resembled that of bismuth. The fluoride of manganese has been reduced by metallic sodium, and we have ourselves reduced the amalgam of manganese to a fine powder, but were unsuccessful in fusing it to a button.

Some authorities say that metallic manganese decomposes water at ordinary temperature; that its color is reddish white; that it oxidizes in the air, and must therefore be kept under naphtha the same as potassium and sodium; that it is slightly magnetic, and that it readily combines with silicium and carbon, and that its specific gravity is 8.

The metal is said to be easily attacked by acids. In reference to the alloys of manganese, not so much is known as could be desired. Its effect upon iron is, however, becoming more familiar, and has been made the basis of several patents. In this country, especially, the use of franklinite iron, containing a large proportion of manganese, is well understood, and the iron produced is valuable for many purposes. In England there are thirty-six patents involving the use of manganese in iron and steel, the earliest of which was taken out in 1799.

Dr. Prieger, of Bonn, has prepared alloys of manganese and iron, and manganese and copper. An intimate mixture of black oxid of manganese, powdered charcoal, and iron filings or turnings, is made in a black lead crucible holding thirty to fifty pounds. A covering is made of charcoal, fluor spar, and common salt, and the contents of the crucible exposed for several hours to a white heat. On breaking the crucible, the alloy of manganese and iron will be found as a perfectly homogeneous button. Two equivalents of manganese and one equivalent of iron, afford an alloy containing thirty-six per cent of manganese; four of manganese and one of iron, give about eighty per cent of manganese. Both alloys are harder than the hardest steel; they are capable of a high polish, fuse at a red heat, do not oxidize in the air, and only partially so in water; their color is between that of steel and silver. These alloys could be used for journal boxes or bearings of machinery, and would be useful in affording a method for the introduction of manganese to iron or steel castings.

The alloy of manganese and copper is prepared in a similar way, and is very hard. Its properties have not been sufficiently studied by our workers in metal, and it would seem to offer a good field for investigation. It will thus be seen that our knowledge of manganese is very limited. The specimen of the metal in the cabinet at Columbia College is very hard and brittle, and has a distinctly red color. It has been kept in a loosely stoppered bottle for several years without any signs of oxidation or absorption of moisture. It probably contains some carbon and silicium.

In reference to the applications of the compounds of manganese to the arts, it may be well to mention a few of them in this connection.

VIOLET COLORS.

A very rich violet color is prepared by fusing finely pulverized pyrolusite and phosphoric acid in proper proportions, digesting in ammonia, filtering, evaporating to dryness, and treating with water; a violet powder remains, called Nuremberg violet.

GREEN COLOR.

Manganese green is the manganate of baryta, and can be represented by the formula $3\,BaO, 2MnO_3$. It possesses a fine green color, and is much safer than arsenic pigments.

PERMANGANATE OF POTASH.

This valuable salt can be prepared by passing chlorine gas through a solution of the simple manganate. This is said to be a more economical way for its manufacture than the old methods.

PERMANGANATE OF SODA.

This salt is made on a large scale, by heating together 12 parts anhydrous caustic soda, 36 parts soda lye of 1·337 sp. gr., 10 parts chlorate of potash, and 18 parts finely pulverized pyrolusite. This, and the preceding salt are of great value in chemistry, on account of the fact that they contain oxygen gas in a condition suited to the rapid oxidation of substances; a property that renders them available as disinfectants to destroy all bad odors, to be substituted for ozone in bleaching, and, in general, to be employed as powerful oxidizing agents. The salts are also valuable for the preparation of perfectly pure oxygen.

IN GLASS.

The use of manganese compounds in glass manufacture is one of the earliest applications of this element; but the fact that glass which has been bleached by it afterwards undergoes a marked change, and in the course of a few months has entirely different optical properties, is not generally known. The oxide of manganese is put in to counteract the effect of oxides of iron, but, in course of time, the oxide is acted upon by the light and air, and colors the glass red. Many a photographer has been puzzled to know why the glass of his sky-light no longer lets light through so as to give him good pictures, and many a gardener has been troubled by the parched appearance of the grape vines in his conservatory, and by the decrease in the yield of grapes; both of these phenomena are due to the fact of the presence of manganese in the glass and the consequent red color. Red glass will not permit any chemical rays to pass, and hence the photographer can take no pictures. The same color will let heat through to parch and dry the vines, but the life-giving rays are cut off. Thus as our knowledge increases, we must order our glass to be made according to the laws of light as well as of chemistry.

SULPHURIC ACID.

When water impregnated with sulphurous acid is treated with sulphate of maganese, the sulphurous acid is changed to sulphuric acid. Here is a use of the oxidizing property of a compound of manganese that may offer a way to important manufactures. It works on a small scale, and probably would on a large one, if any one would try it.

OXYGEN.

The mineral pyrolusite, or black oxide of manganese, has long been employed to make oxygen, but the recent method of converting it into manganate of soda, and afterwards expelling the oxygen by heat, is less familiar to us. A better method than the manganate of soda is said to be the employment of the corresponding lime salt. By heating lime and binoxide of manganese in a current of air, the manganate of lime is formed, which is less likely to fuse than the soda salt, and hence is more readily made. If the air be passed over the lime for a considerable time, the permanganate of lime will form, and this bids fair to afford us the permanganates in a ready and cheap way, and also offers a method for isolating pure permanganic acid by decomposing the lime salt with sulphuric acid.

By mixing the permanganate with the binoxide of barium, we shall be able to prepare oxygen gas in the cold, by simply pouring an acid upon the salts in a flask, just as we make hydrogen by means of zinc and sulphuric acid.

We have gone far enough in our sketch to show that the applications of manganese are very numerous, and we may recur to the subject again at some future time, particularly as we have said nothing about its most important use in the manufacture of chlorine.

Improvements in Salt Making.

The old and usual mode of taking salt, when made, out of the pans is by a man standing on what is called a "hurdle" up each side of the pans, and with a long shaft, having a rake at the end, drawing the salt to the side of the pan, and then with a perforated spade lifting the salt out and putting it on to a bench, into carts, or into the stove-house. For the men to be able to do this work, the place being very hot from the steam and heat of the brine, they have to work nearly in a nude state, and to render the place a little colder they have to burn down the fires from under the pans for several hours before and during the time this work is going on; and when the quantity of salt has been taken out there has to be put into the pan a large amount of cold brine, which then renders it necessary to push the fires very much to get up the heat again. This causes a loss of time in making salt, and is very destructive to both pans and the brickwork surrounding the fires. Salt having to stay so long a time in the pans between the times of emptying them, and being a substance so naturally inclined to fasten itself to anything that is hot, a scale, from two to four inches in thickness, will form in a fortnight on the bottom of the pans, and requires to be hammered to break it. This scale often adheres so fast on the plates of the pans that they are twisted into all shapes and forms, causing breakages. They are also often burned into large holes, the leakages from which allow the brine to run into the fires and flues, and injure and destroy the brickwork so much that the repairs often amount to one-fifth of the value of the salt made. The work being so very unpleasant for the men and the repairs such a serious item of expense, Messrs. Hamer and Davies, having set up extensive new salt works at Wincham, England, determined to find out means to obviate these defects as far as possible, and they have, it is thought, succeeded, and have taken out letters patent for their improvements. They have now three pans at full work so successfully as to quite equal all their expectations. The salt is taken out of the pans by steam power instead of by men, and continued night and day alike. The salt being taken out so regularly prevents the formation of the scales, so that the pans need no hammering, and, therefore, no twisting of the plates, and also obviates the leakage and consequent destruction of the brickwork and filling up of the flues, as in the old method. All these improvements combined, more salt is made from the same quantity of fuel, and in less time, from the same dimensions of pans.

The mode in which this work is performed is by having a railway up each side of the pan, or by making the pan slide into a railway, and having a carriage across the pan, constructed with a shaft through the center, to which rakes are attached by one end; the other end of the rakes travel on the bottom of the pan. The carriage has a flanged pulley or wheel on each end, the same as a railway carriage, and travels from front to back of the pan, with the rakes that cover the whole width of the pan. The machinery is so arranged that the carriage is drawn backwark and forward by wire ropes. When the rakes are at the front end of the pan, and begin to be drawn towards the back, they take the salt as it is made with them at the rate of about 20 ft. per minute until they arrive at the foot of an incline upon which the rakes travel, and on arriving at the top the salt drops into carts standing to receive it. The travel of the rakes at the foot of the incline changes, the speed being reduced to about two feet per minute while ascending the incline, so that the brine runs from the salt down into the pan, instead of in the old way on to the hurdles, and wasted, and it is quite hot when it gets into the pan again. The rakes having dropped the salt into the carts, the machinery is so arranged that the carriage is raised on one side, lifting the rakes up, and being held up by a leg or catch on each end of the carriage; a return motion takes place and the carriage and rakes go back to the front of the pan, at which place the catches or legs are set at liberty, and the rakes go down into the pan and commence another journey. Each double journey is made in nine minutes on a pan of 70 feet long and 26 feet wide. By this process the salt made is put into the carts every nine minutes, and when these are filled the stages on which they stand are so arranged that one man can take all the salt away from three pans and put it either into railway wagons, boats, or into the store-house, as may be required.

At this time the salt being made is the butter salt of the finest quality, and the advantages of the machinery employed in its production over the old plan are the following: The color is much better than that of the salt made in the usual way; there is very little scale formed on the pan bottoms, therefore the repairs needed are much less. In addition, it would appear that more effective control can be obtained over the flues, so that the smoke consuming principle can be much more effectively applied than previously.

IT is said that a new description of lava is being thrown from the crater of Vesuvius since the last eruption, consisting of crystallized salt. This beautiful phenomenon has hitherto been unknown in volcanic natural history.

AVOID bathing in cold water or in a cold room, unless there is a full and quick reaction. Chillness after a bath is a sure indication that it was not properly taken.

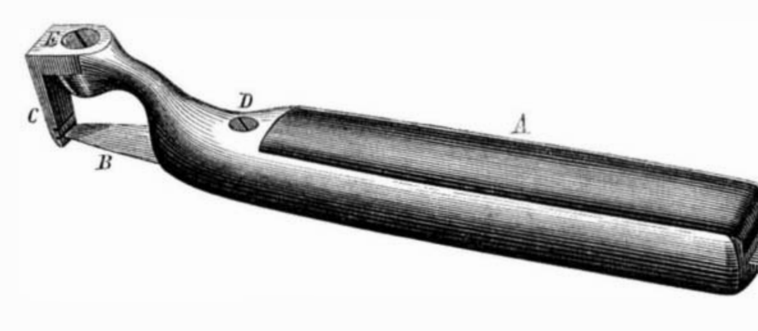
Improved Shoemaker's Trimming Knife.

This is a very neat and useful tool, designed to obviate all danger of cutting the "uppers" of boots and shoes while paring off the edges of the soles, and also to provide for paring off the edge, at a uniform distance from the stitching, by unskilled hands.

It consists of a handle, A, having a knife passed longitudinally through its body; the protruding point, B, meeting an adjustable guard, C. This guard not only prevents the cutting of the "uppers" by accident or carelessness, but the point of the guard which extends beyond the point of the knife also acts as a gage to keep the knife at a constant distance from the stitching.

Very few have not at times found their uppers prematurely breaking away from their soles owing to the carelessness of the shoemaker while paring; but many have been led to believe they had, by accident, cut the upper in walking. The truth is, that in a large majority of cases, the shoemaker is solely at fault. By the use of this simple tool all danger of cutting the uppers may be avoided.

The knife is withdrawn from the handle to sharpen it by simply loosening the screw, D, and the guard may be set to any required angle to suit the operator by means of the screw, E.



REIST'S PATENT TRIMMING KNIFE.

The testimony of a large number of practical workmen who have used the knife is unanimous in its favor as a time-saving and efficient tool.

Patented, January 21, 1868, by John Reist, of Philadelphia, Pa., who may be addressed, for further particulars, at 531 Race street.

An Enormous Canal Basin to be Built Between Piers One and Five, East River, New York.

There is at present a very important movement on foot among the great grain merchants of this city, which as soon as it assumes a tangible form will not only prove a great benefit to the metropolis, but will be of vast benefit to the shipping interest of the country. By a Legislative act certain basins and slips have been set apart on the East River side of the southerly end of the island for the exclusive use of the canal interests. This area commences at Pier No. 1 and terminates at Pier No. 5., and embraces within its limits Coenties and other large slips, but the space thus occupied is considered wholly inadequate for the wants of the grain traffic of this city, which, of late years, has assumed gigantic proportions, and has no other depot or harbor for its reception save the space mentioned. The company under whose auspices the improvements are to be made have secured the services of General Egbert L. Viele, who, after having taken a thorough survey of the locality and its requirements, submitted his plans for improvements to the directors of the Board, and they are deemed highly satisfactory.

The new basin will take in the same water frontage from Pier No. 1 to Pier No. 5 as formerly, but the projecting piers will be removed, and the bottom dredged to a greater depth to admit canal boats laden with grain during both high and low tide. Beginning at Pier No. 1, a solid granite wall two feet in width will be built, extending to the terminus at Pier No. 5, and thence out into the East River a sufficient distance to afford a secure berth for the accommodation of at least five hundred canal boats. At the upper extremity of the basin, it is designed to have erected one of the largest elevators in the country—surpassing even the mammoth elevators of Chicago and Buffalo. The structure will be of a hight sufficient to discharge grain from canal boats into ships. It will be composed entirely of iron and slate.

When this great basin is completed—it will require two years' time, as work will not be commenced until a few preliminaries are arranged—it will be the first of its kind in the United States, and it will prove a great blessing to the canal boat fleets, as well as an incentive to the city authorities and men of wealth to commence the building of docks and piers of solid masonry, instead of the present dilapidated wharves, which are a disgrace to a city so populous and wealthy as this great commercial mart of the Western hemisphere.

The necessity of this basin is shown in the fact that two thirds of the vast crops of the cereals grown in the West find their way to this city in canal boats from Buffalo, and from this port are shipped partially in bulk to Liverpool and Havre. Persons standing on the banks of the Hudson during the season of navigation cannot fail to notice the great fleets of canal boats under tow proceeding to their destination on the East River side, loaded down to their guards with grain.

A Step in the Right Direction.

The Chicago *Railway Times*, states that on the Pensylvania Railway uniformity of design and style in machinery is now the inflexible rule in every department and class of equipment and manufacture. The reform in this respect, begun ten years since in the car department, now extends to, and is very nearly realized to all the departments of the road. The end arrived at was, as then explained, "to get our entire equipment in each class uniform;" and what particularly commended it was, that it would dispense with a superfluous variety of patterns and duplicate work on hand for repairs. A larger view of late has presented itself, expressed by the superintendent of motive power and machinery, in his report for 1868, who says that its importance, "both as a measure of economy and increased efficiency cannot be too highly estimated; for, with such a system only can the cost of repairs of locomotives and proportions of engines out of service be reduced to a minimum." The superintendent of motive power and machinery is assisted by a mechanical engineer, in charge of the drafting room, after whose designs all work is made; and gages and templets are placed in the hands of all manufacturers for the company, with drawings of every portion, even to the seats for firemen and engineers in locomotives. As old stock wears out, it is cut up; and the numbers reappear on "standard" engines and cars of uniform pattern throughout. No deviation is permitted, at any one's will or caprice; all changes must be adopted generally. The system is not a novel one; it is only peculiar to the road in the extent of its application. When the new car shops are completed, the company will manufacture all its own cars; and the time is not distant when it will replace all failing engines, and make all necessary additions to motive power, after a system equally comprehensive. Indeed, it is calculated that in five years, instead of the *forty* different classes of engines now in use (456 at this writing; additions every week), there will be but *three* main classes—standard 8-wheel passenger, standard 10-wheel freight, and standard shifting. Each of the first two classes will have a "modification," the difference, however, consisting only in the diameter of the driving-wheel and the size of the boiler. An obvious result of the system will be the fact that many of the most important pieces of car or engine, being common to their class, will be *interchangeable*—in locomotives, for example, among castings, the driving-boxes, eccentrics, eccentric straps, etc., etc. The standard locomotive of the road is no less admirably adapted to its work and condition in style than in construction. Devoid of all the brass ornaments with which superfluous outlay it is customary to overload engines; painted a plain black, with number in gilt and a few neat gilt tracer-ies. it is easily kept clean and its entire look is in keeping with the character of its work. The engineers who at first parted reluctantly with the brass and fancy painting would not now have them back. Their mistresses are admired not for adventitious charms, but for unpretentious, solid worth; for the relations "she" sustains to her lord and master are by no means without the refinements of sentiment and affection.

Running Street Cars with Tanks of Compressed Air.

The New Orleans *Commercial Bulletin* says a company has been organized in New Orleans to utilize several inventions for the application of condensed air, as a motive power for cars on city railroads, and is soon about to bring the design to a test.

The idea is that each car shall have two cylinders, or tanks, to contain the compressed air, which is to be used as a motor. These cylinders are to be on the top of the cars, and are to be be charged at the depot by an engine worked with steam. Metallic cylinders were first tried, but they were found to be too heavy, and the difficulty of the company has been to find a lighter material, available for the purpose. Paper cylinders have been determined on, and Capt. Roberts is engaged in making four to be used on the cars, two on each. They are made of strong sheets of paper, laminated to a thickness sufficient to bear the great pressure required to contain the air condensed into them. The several lamina are laid up with glue, and the paper fabric is strengthened with an envelope of cordage. In connection with these cylinders there is to be an engine, for which a special patent has been taken out, to receive the condensed air and rotate the wheels of the car.

One of the cylinders is finished, and has been subjected to a trial of three hundred pounds to the square inch without yielding. Three hundred pounds to the square inch, the inventor states, will suffice as a motor. He says he has with a platform car, experimented on a street railroad with far less power than that, and the experiment resulted satisfactorily. He used two old iron cylinders, weighing sixteen hundred pounds, which leaked through the riveting, and there were twenty-eight persons on the car.

Starting with but ninety pounds of pressure to the square inch, and with the weight of cylinders and men mentioned, he made three miles and a half in seven minutes and fifteen seconds. And as to curves, when the motor was reduced to fifteen pounds, to use his own words, he went around a street corner "as smoothly as a ball would roll on a billiard table."

On the Time Required to Discriminate Color.

In a recent number of Pfluger's *Archives of Physiology*, MM. Burckhardt and Faber describe an apparatus consisting of a pendulum of wood with a movable leaden weight attached, which has a slit at its lower end. While this slit vibrates behind a second narrow fissure, a momentary transmission of light occurs, the duration of which can be varied by raising or lowering the weight of the pendulum, or by increasing or diminishing the width of the slit. The source of light consisted of a milk-white glass plate illuminated by a petroleum lamp, and colored glasses of various tints were introduced into the slit of the pendulum. The intensity of the light was regulated and modified by the withdrawal of the lamp from the white plate, or by the interposition of smoked glasses, and in each experiment the observer was required to state what color shot across the slit. In the first series of experiments the intensity of the illumination required, when permanent, to enable the observer to state with accuracy the color perceived, was investigated; as well as the degree at which all perception of color ceased. In both series bright yellow occupied the first position; red and violet the last. It was also observed, that, with transient illumination, bright yellow gave the most distinct sensation with the smallest amount of light and the shortest duration. After this color, there followed with Burckhardt, yellow, bright blue, blue, green, grass-green, violet, red; and with Faber, yellow, blue green, grass-green, clear blue, red, violet. Experiments were then made to determine the intensity of the light requisite for the accurate perception of color, the duration of which was only ·0029 of a second, together with that required when the impression was persistent. They found the relation for all colors nearly equal in the same individual, though widely different for the two observers, the proportion being with Burckhardt as 173 to 1, and with Faber as 513 to 1. They conclude thence that the various colors must have the same or nearly the same brightness, in order, with a minimum duration, to yield a minimum sensation of color. The experiment with more protracted duration of the impression showed that the intensity of the excitation necessary to produce the least possible sensation of color, does not diminish proportionately with the increase of the duration of the stimulus.

Anvils.

The face or table of anvils as at present made is often defective, having frequently hard and soft places after hardening, which face should be equally hard all over its surface, and the steel in some instances not being properly welded to the iron part or butt which forms the lower part, the anvil is thereby rendered unsound and not fit for use. Some improvements recently patented by an inventor of Sheffield, England, have for their object the removal of such defects, and consist in so making anvils that the face may be equally hard all over when finished, and in so casting or welding the butt to the head or upper table that the parts may be thoroughly amalgamated and the anvil made more durable at a less expense than hitherto.

He first prepares a model of the size and shape of the anvil to be produced. He then places it in a box, covers it with composition, and fills up the box with sand in the ordinary manner. After the model is removed and the sand perfectly dry (this being done in the usual way), he first pours in the molten steel to form the face or table, then, through the same aperture (after the steel on the table is sufficiently cool), he pours in a very mild molten steel, which flows over the table and gives the requisite toughness and solidity to the steel beck. After a proper time has elapsed, he pours in through another opening the iron or metal, which also runs upon the steel and forms the lower part or butt of the anvil, and a perfect amalgamation takes place between the iron and steel. The casting being complete, it is then finished in the ordinary manner for castings.

To harden the work, a large metal bosh or trough, 6 in. or 8 in. deep, is formed, in which is inserted a number of perforated sharp-edged bars of metal, on which the anvil is allowed to rest on its face or upper surface, either flat or slanting. A sluice communicationg with a reservoir of water is then opened, and a force of cold water is allowed to flow upon the face by an upward cast and to pass under the anvil and over the bars to any depth required. By these means a much harder and more regular surface is obtained than by the present mode of manufacture. After this the surface is ground in the ordinary way.—*Mechanics' Magazine.*

Quicksilver and Iron.

The difficulty of imparting to iron a complete and uniform coating of mercury by dipping it in a solution of mercury is well known. The process may, however, be very easily accomplished by cleaning the iron first with hydrochloric acid, and then immersing it in a diluted solution of blue vitriol mixed with a little hydrochloric acid, by means of which it becomes covered with a slightly adherent layer of copper, from which it must be freed by brushing, or rubbing with sand-paper, and washing. It is then to be brought into a diluted solution of mercurial sublimate, mixed with a few drops of hydrochloric acid. The article will now be covered with a layer of mercury, which cannot be removed even by hard rubbing. This layer of quicksilver protects the iron from rust, especially it be washed with spirits of sal ammoniac after the amalgamation. Articles for the laboratory, and for other purposes, coated with quicksilver in this way, and allowed to lie exposed with similar articles not so protected, retain their luster perfectly, while the others become covered with rust. This same process is especially applicable to the coating of the steel or iron instruments for which oil is generally employed, and will probably be found to resist the injurious effect of moisture much more perfectly than the oil.

EUROPEAN artificers have not hitherto been able to imitate with success the gongs and cymbals made in China; but it has recently been found that the secret of their manufacture consists in the bronze of which they are made being hammered into shape at a red heat, at which temperature it is as malleable as soft iron. A bronze containing 20 per cent of tin is very brittle when cold, but is tough and malleable when hot.