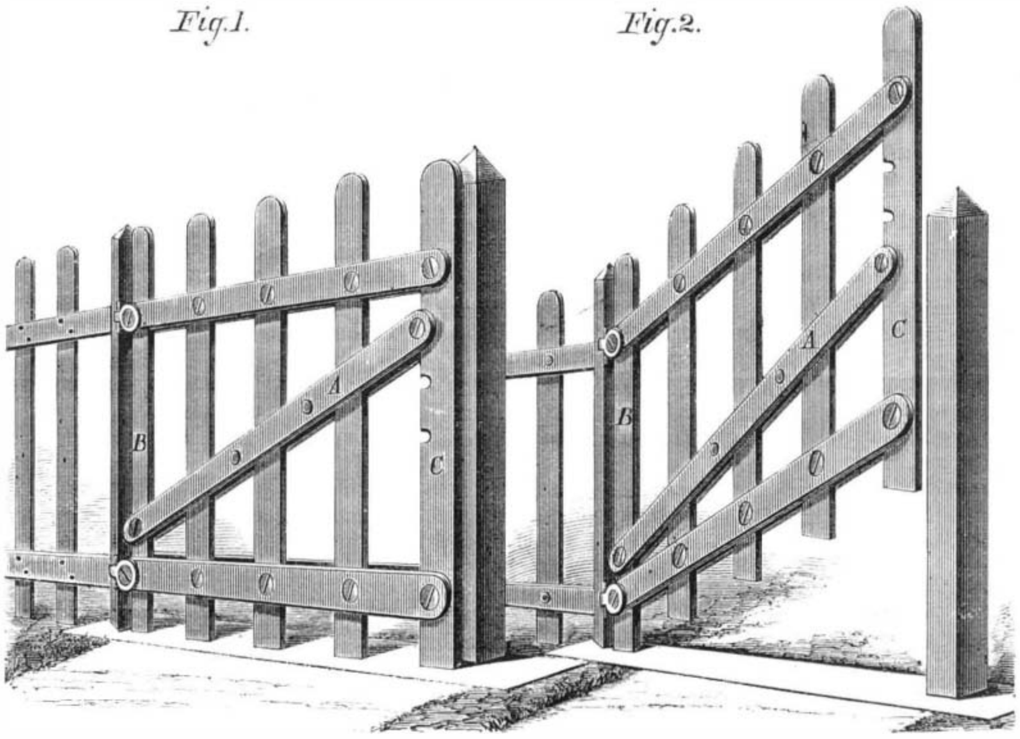
### Improved Farm Gate.

Mr. E. B. Decker, of Carrolton, Greene county, Ill., has made an improvement in gates, which we here illustrate. The invention appears a good one, and is likely to obviate a great many defects in other farm gates.

Fig. 1 is a view of the closed gate. It is constructed of upright slats and horizontal rails which, instead of being firmly connected, are riveted together so as to be able to move freely round the rivets. The position of the gate is maintained by the brace, A, which diagonally crosses it. This brace is composed of two pieces, which are riveted together as shown in the engraving, the rear end being pivoted to the hinge slat, B, and the forward end being supported, by its rivet, in a notch in the front slat, C, and, at the same time, bracing the front slat, so that it cannot fall lower and bring the gate out of position. It is obvious that, if the front slat were raised, it would allow the brace to fall into the next notch, and so on until the gate reached the position shown in Fig. 2, in which the brace would firmly hold it. The brace will thus admit of the gate being raised without being opened, to allow of sheep, cattle, etc., passing under it and to clear the winter snow; while sagging is prevented in any position.

Patent is now pending through the Scientific American Patent Agency.

Further information may be had by addressing the inventor as above.




DECKER'S FARM GATE.

### IMPROVED PUDDLING TOOL.

The process of hand puddling, in the ordinary reverberatory furnace used for the purpose, can be divided into four stages:

(1) Melting. The pig iron, together with a proportion of hammer slag, is charged on the bed, previously lined with either puddling mine, bulldog, or both, and plastered over with wet hematite ore. As the cast iron gets softened by the heat, it is broken into smaller pieces and stirred up with the cinder. This is done by the hand rabble, which has to be continuously moved over the whole surface of the bed. This stage lasts about thirty-five or forty minutes.

(2) In the second or boiling stage, the iron has to be violently rabbled in order to bring it into a state of ebullition or boiling. In this operation, the puddler has to exert himself very considerably, working the rabble to and fro, and from side to side, over the bed.

(3) "Coming to nature." The iron now begins to thicken and to get tougher and tougher; the "boil" stops, and it "comes to nature" or begins to assume the consistency of heated wrought iron. The puddler works it in this pasty consistency from side to side of the furnace, separating it into different pieces.

(4) Balling. The wrought iron is now collected into balls, varying in weight and size, ready to be taken out of the furnace to be hammered or squeezed into blooms. This stage takes about ten minutes.

In the ordinary mode of puddling, should the pig iron get entirely melted on the bed, it is a disastrous circumstance for the puddler. The bath of metal, with its even surface hidden under the lighter cinder, offers very slight surfaces of contact to oxidation. To meet this, he is forced to very violently exert himself in stirring up the metal; and he is obliged to shovel in quantities of hammer slag, cinder, or other sources of oxygen, which cool down the metal and lower the quality of the product.

There can be no doubt that an unaided man's strength is insufficient for this labor. Dr. Percy, whose opinion as a metallurgist, chemist, and medical man is universally known to be of the very highest importance, states that the majority of puddlers "die between the ages of forty-five and fifty years; and, according to the returns of medical men to the registrar, pneumonia, or inflammation of the lungs, is the most frequent cause of their death. This is what might have been anticipated from the fact of their exposure to great alternations of temperature under the condition of physical exhaustion." They are also liable to cataract, induced by the intensely bright light of the furnace; and the forearms and faces of some puddlers are also often scorched to a bright red tinge in a curious way. As Dr. Percy observes, "it is not surprising that puddlers should manifest a growing disinclination to bring up their children to his occupation, to which, as a general rule, their strength ceases to be equal beyond the age of forty-five or fifty." On the puddler more than Adam's curse seems to have fallen—copious drops transpire, not merely from his brow, but from all his almost naked body, while engaged in what Mr. W. Bridges Adams has termed "the absurdity of setting a number of human beings to stir up a metallic pudding in order to throw off the scum."

To Mr. Edward Hutchinson, of Messrs. Pease, Hutchinson & Co., Skerne Ironworks, Darlington, England, belongs the merit of having first invented and experimented with the revolving rabble. His trials were very successfully carried out as long ago as 1865, being, however, relinquished during the same year, and without having been published in any way. M. Dormoy quite independently took up the same idea, and has been perseveringly working it out since 1866.

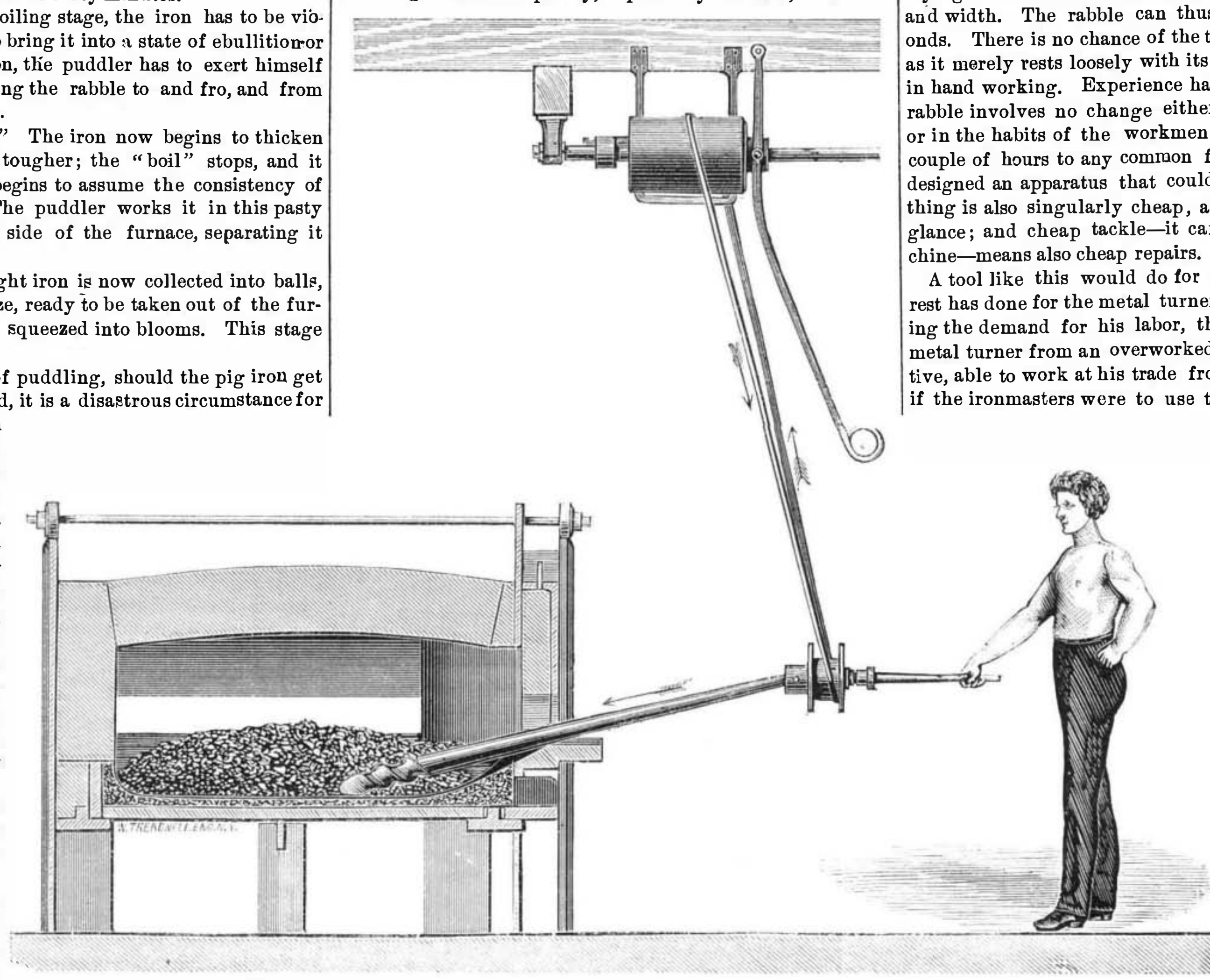
Any puddling machinery must be essentially simple and non-liable to get out of order by the roughest and most careless usage. This simplicity, required by the men, is also required by the furnace; the high temperature of which, with the attendant rapid current of air passing through, must not be interfered with.

A glance at the accompanying illustration will render the whole apparatus intelligible. A common belt, driven from shafting six feet above the furnace, rotates the sheave, loosely jointed at one end to the puddling rabble, and at the other turning on a pin held in the hand of a puddler. To prevent any jarring action to his hand, the pin he holds may be wound round with spun yarn or gasket, embraced by a leathern or india rubber tube. The strap thus rotates the rabble, supports part of its weight like a suspension link, and acts as a universal joint, much as in the familiar instance of the rotating hair brush. The belt must evidently adapt itself with ease to the great variety of positions which have to be taken by the tool in every part of the furnace, and to the necessity for removal when too hot, and to the progressive changes in the metal.

Mechanism could easily be applied to the rotating rabble in order to work it regularly to and fro; but this additional complication has not been found necessary. Its great speed, from 300 to 800 revolutions per minute for white pig, and from 800 to 1,000 for gray metal—is found to give it all the mechanical energy required. The end of one form of rabble, about $4\frac{1}{2}$ inches in diameter, when revolving with 500 revolutions, necessarily has a speed at its circumference of nearly 600 feet per minute. On the other hand, the iron, even when boiling, is not thrown up. The centrifugal impulses are not sufficient to overcome the cohesion of the hot metal. The power required has been indicated by Herr Biedermann, now of Floridsdorf, near Vienna, at from one quarter to one half of a horse power per furnace per hour; but the draft would necessarily increase towards the end of the heat. There is no bearing near the furnace necessarily liable to get hot; no gearing to break on any sudden resistance; and the strap itself acts in its usual way as an admirable friction brake. It is difficult to imagine how the apparatus can come to grief in any other way besides breaking the strap. For such a case, a spare belt is kept hanging on the shaft; or the puddler could even merely go on in the ordinary way. If kept well greased, however, the belt lasts from three to four months without renewal. Any diminution in speed can be obtained by slightly relieving its weight off the belt—thus allowing more or less slip. On the other hand, any unusual resistance can be overcome by the puddler pressing the tool down on the belt. Simply by crossing the strap, the rabble can be rotated from left to right, or *vice versâ*, alternately, as required. The tools, in spite of their extra weight, are easily removed from the furnace by taking them off the strap, by means of a hook on a light chain suspended near the furnace from the roof, and laying them on small trestles about eighteen inches in hight and width. The rabble can thus be changed in thirty seconds. There is no chance of the tool disturbing the fettling, as it merely rests loosely with its weight on the bed, just as in hand working. Experience has shown that the revolving rabble involves no change either in the plant of the works or in the habits of the workmen: it could be adapted in a couple of hours to any common furnace: and the author has designed an apparatus that could be at once applied. The thing is also singularly cheap, as can be seen at the first glance; and cheap tackle—it can scarcely be called a machine—means also cheap repairs.

A tool like this would do for the puddler what the slide rest has done for the metal turner. While actually increasing the demand for his labor, the slide rest has raised the metal turner from an overworked drudge to a skilled operative, able to work at his trade from youth to old age Even if the ironmasters were to use the revolving rabble merely to relieve their men, and without requiring a greater number of heats from them, they would gain:—(1) A great improvement in the quality of the iron produced; (2) a great diminution in the number of ruinous "cobbles" or "wasters;" (3) the capability of working up very gray or also inferior kinds of pig, without using any "fined metal;" (4) diminution of loss in mill scale between the rolls.

Perhaps the most important truth which has been lately elicited touching mechanical puddling is its effect in improving the quality of the puddled bar. Mr. Danks has worked up almost every kind of American and British pig metal with excellent results as to quality. Mr. Adam Spencer has in his revolving furnace produced excellent iron from Middlesbrough metal containing 2 per cent of phosphorus. As already noticed, experience with oscillating rabbles points to more or less improvement in the quality. Mr. Hutchinson, as we have seen, improved the quality of Cleveland iron with his revolving rabble. M. Dormoy has puddled with success some old cannon balls the Turks left behind them at Temesvar, in Hungary, so white and containing such a large quantity of arsenic as to be utterly intractable by the ordinary process; he has also operated at Zeltweg, in Styria, upon pig metal alloyed with copper and sulphur; upon the sulphurous pig metal of the Loire and



DORMOY'S REVOLVING RABBLE APPLIED TO COMMON FURNACES.

that of the Moselle—the latter containing very large percentages of phosphorus. In every case, perfectly tough iron and steel, often rolled into the most difficult special shapes, have been produced. It is clear to the eye of the mechanic that all these otherwise very differing apparatus are alike in one particular, namely, more or less thoroughly stirring up the first broken, then molten, and lastly pasty, metal, together with the fettling on the bed. The infinite variety of chemical conditions formed by the different kinds of pig and fettling, under which these results have been obtained in England, the United States, in France, Styria, Hungary, and Austria, clearly debar us from searching for any recondite chemical cause; and it is evident that, whether this thorough stirring be obtained by exhausting manual labor, or by an imperfect oscillating rabble, or by a revolving bed or a revolving rabble, the mechanical effect must be the same: That is to say, the molten cast iron has to be continuously stirred up in order, in the common furnace, to expose it to the oxygen entering at the door and contained in the fettling; in Mr. Danks' and Mr. Spencer's furnaces to the oxygen in the latter only.

There thus seem to be three principal reasons why mechanical puddling, or, in other words, good puddling, produces such good iron. The operation is (1) completely carried out; (2) the puddled bar is really homogeneous; (3) the multiplication of the surfaces of contact intensifies the purifying chemical reactions.

### Nevada Silver.

At the recent meeting of the American Institute of Mining Engineers in New York, the President, R. W. Raymond, read an interesting paper on the silver mines of Nevada, from which we take the following:

The Eureka district stands now third in rank of the silver producing camps of Nevada. During most of the year, four and sometimes five furnaces (combinations of the Rachette and Piltz) have been in blast. Late last year, and in the earlier months of the present year, the Eureka Consolidated Mining Company discovered immensely valuable and extensive bodies of ore in the Lawton tunnel. Raby Hill is a spur of the diamond range. The openings of the Eureka Consolidated, as well as those of the Richmond and Tip Top, are on the western and the new ones on the eastern slope. The strike of the ore body is nearly east and west, and its dip about 45 degrees to the northeast. For this reason ore was first discovered on the western slope of the hill, where the vein crops out.

The Lawton tunnel is now in over 600 feet, and passes 130 feet to the north of the Keyes shaft, between it and the windsail shaft. At its end, it is in ore. The Keyes shaft is now 175 feet deep and serves as the main hoisting shaft for the old works. These are the largest extant in broken quartzite.

The approach to the vein matter is distinguished by a yellow color of the first dense, afterwards broken, limestone; next by a stronger impregnation of pulverulent brown and yellow iron ore and stripes of the first; finally, the ore body proper—brown iron ore, with impregnations and bands of carbonate of lead or lead ocher, is reached.

While on the western slope, besides the yellow memetele, large masses of solid carbonate of lead, with so called "black carbonate," which is probably a new mineral, and little galena were found. The ores encountered on the eastern slope in iron stained masses, which are poorer in lead, are principally highly argentiferous galena and "black carbonate" in lumps and nests of often over 100 pounds weight. For this reason, there is now much more base bullion produced than formerly. Seven tuns of ore now produce one tun of lead, while formerly it required ten or twelve tuns. At Richmond, the best and most profitable smelting works in the State are building energetically. All signs point to the enormous industrial increase during the coming year, especially if capitalists should take up the Prospect Hill mines.

The total product of bullion of the Eureka Consolidated, during 1871, was about 3,172 tuns. The average contents in gold and silver for the whole yearly product may be estimated as $250 per tun. Adding $100 per tun for the lead, we have a gross value of $1,110,314·10. The gross value of the total production of gold, silver, and lead, during 1871, by the various companies, including the Eureka Consolidation in Eureka, was $2,035,523·86; the total quantity of bullion shipped was 5,665 tuns, 1,074 pounds.

All the base metal mines in the district have the same character as those previously described, and vary less in the classes of ores occurring in them than in the size of the ore bodies.

WINDOW SASHES.—The most convenient way, to prevent loose window sashes from rattling when the wind blows, is to make four one sided buttons of wood, and screw them to the stopes which are nailed to the face casings of the window, making each button of proper length to press the side of the sash outwards when the end of the button is turned down horizontally. The buttons operate like a cam. By having them of the proper length to crowd the sash outwards, the sash will not only be held, so firmly that it cannot rattle, but the crack which admitted dust and cold air will be closed so tightly that no window strips will be required. The buttons should be placed about half way from the upper to the lower end of each stile of the sashes.

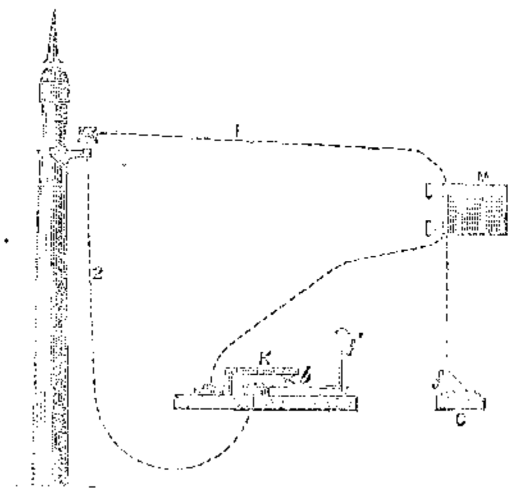
THE *Adriatic*, a new and splendid ocean steamer, recently made the passage from Queenstown to New York in seven days and sixteen hours,—the quickest westerly voyage ever made across the Atlantic.

### Testing Telegraph Insulators.

Insulators usually undergo a most careful visual investigation at the factory, and all such insulators as are free from mechanical defects subsequently have to pass through a most delicate system of electrical testing, in order to prove that they are electrically sound, and are really insulators. In spite of all the precautions taken, however, bad insulators do show themselves on land lines. Whether they have escaped the searching tests or have become bad after being put up, such is the case, and a great loss of the electric current is due to the presence of bad insulators on a line—contributing to much bad working.

These defects have made themselves seriously felt on some of the Indian lines, where the insulators adopted are porcelain, protected with a galvanized iron cover; and in order to detect the faulty insulator without the necessity of removing it from a pole, the following plan has been arranged by Mr. Louis Schwendler, of the Indian Telegraph Department, and is presented in *Engineering:*

The principle of the plan is to produce a series of electro-magnetic currents, pass them through the defective insulator, and to measure these currents by the effect they produce upon the body of the person engaged in the testing operation. The annexed diagram will show the arrangement of the wires and the details of the test.



M is a small magneto electric machine connected from one pole by No. 1 wire on to the insulator to be tested, and from the other terminal to the upper part of the small key, K, and also to the platinum stud *f* in C. The lower part of the key is connected to the insulator bolt and bracket; by pressing the metallic key with its platinum stud *f′*, contact is broken between the points at *b*.

It is necessary that the wire No. 1 should be well insulated, so that no leakage beyond that due to the insulator itself can interfere; the No. 2 wire should also be well insulated. Before testing the insulator, it should be properly cleaned, and a temporary disconnection made between it and the line wire; this should of course be done before the connection in the diagram can be made.

If the handle of the magneto machine be turned and currents produced, it will be seen that, if there is any leakage through the insulator, the currents must pass through 1 and 2 wires, and by means of the contact at *b* and K back to the machine; the slightest pressure on *f′* will at once interrupt the circuit, but if the key, *f′*, be pressed by one finger, and the stud, *f*, in C, by another finger of the same hand, the circuit will again be closed through the hand. And if there be any leakage, the slight positive and negative currents due to that leakage (forming a circuit) will be felt as shocks from the machine, in a greater or less degree, according as the leakage is more or less. The amount of these shocks and, of course, the whole management of the test is in the hands of the one experimenter, who, while carefully feeling for the shocks with one hand, is with the other moderating the revolution of the machine to the requirements of the case.

It does not follow that, because no shocks are felt, the insulator is perfect. There is one more test which the experimenter can perform, but which should not be done until the finger test has failed. When such is the case, let one finger remain on *f* and touch *f′* with the tongue; if no shock be then felt, the insulator may be passed as perfect, as the electro-sensitiveness of the tongue may be considered as very great.

To give a practical test of the value of the finger and tongue when applied to such a purpose, Mr. Schwendler made some tests on some insulators (whose resistance had previously been accurately measured) using the currents produced from one of Siemens' magneto alphabetical instruments.

| No. of insulator. | Resistance in Siemens' units. | Force of the magneto-electric currents across the insulators measured by the human body. |
|---|---|---|
| 1 | 110 | Strong shocks felt by the fingers. |
| 2 | 130 | " " |
| 3 | 145 | " " |
| 4 | 190 | " " |
| 5 | 750 | Slight shocks felt by the fingers. |
| 6 | 2,300 | Shocks no longer felt by the fingers, but strongly by the tongue. |
| 7 | 5,700 | The tongue no longer feels shocks, but a strong acid taste. |
| 8 | 7,100 | Taste of acid distinct, but slight. |
| 9 | 8,200 | " " |
| 10 | 82,000 | The tongue no longer feels any thing. |

From the above experiments, it will be seen that, up to 1,000 Siemens' units, shocks may be felt by means of the fingers, and beyond that and up to 8,000 the loss of insulation can be detected with the tongue—an instrument which Mr. Schwendler considers the best for discovering faults of want of insulation, because it is sufficiently sensitive, never gets out of order, and, besides, is the least expensive instrument that one can employ.

### Art Progress.

Dr. Dressler lately read a paper, before the Society of Arts, wherein he said:

One of the chief hindrances to the advancement of decorative art is to be found in the designers themselves, many of whom are ignorant and have no art ability; while others who have, often produce works which, though beautiful in form, are inconvenient in use and consequently calculated to bring art into disrepute. The fitness of the ornamentation of an article to the use for which it is designed is the end to which designers must educate themselves.

Certain manufacturers may truly be regarded as hindrances to art progress. It is curious that there are many men who would not rob another of a farthing, and yet who eagerly look for every new pattern which more honorable manufacturers than themselves produce, with the view of copying them if they be good and are not protected by registration, or of producing others as nearly like them as they can if they be registered.

Much has been said respecting the unwillingness of manufacturers to issue designs of an art character, and to pay such prices for patterns as will fairly compensate the designer for producing a carefully considered work. I have had as much to do with manufacturers, I think, as most artists, and I am bound to say that I have found most of them both willing to try new things and to pay handsomely for well considered designs; but the manufacturer cannot be expected to produce many patterns such as will not sell when placed on the manufactured article.

That class of the public who are pleased with whatever is "loud" and showy immediately hinder the progress of art, since some manufacturers will strive for the patronage of the most vulgar taste; but this hindrance will disappear with the increase of art knowledge.

### Refrigeration by Means of Ammonia.

A Tellier refrigerating machine, just erected in the largest brewery in New Orleans, owned by George Merz, supplies the large storeroom, holding 5,000 barrels of ale and lager beer, with dry cold air at a temperature of 40°, the temperature outside being 85°. The refrigerating agent is liquefied ammoniacal gas, and to cool this large room but ten cubic feet of the material is required.

A large refrigerating cylinder, through which passes a number of pipes, is filled with the liquefied ammonia which vaporizes, rendering the pipes through which the air passes excessively cold. The ammoniacal vapor is subsequently compressed again into liquid form and returned to the cylinder to repeat the same operation without any waste of the material.

The Carré apparatus, another form of the ammoniacal ice and refrigerating devices, has been in use in New Orleans and Texas for several years with much success.

### Dyeing Veneers.

It has been found that veneers soaked for twenty-four hours in a solution of caustic soda containing ten per cent of soda, and boiled therein for half an hour, may be, after washing them with sufficient water to remove the alkali, dyed throughout their mass. After being dyed, they must be dried between sheets of paper and pressed to keep their shape. It is stated that if, after the veneers have been treated in this way, they are left for twenty-four hours in a hot decoction of logwood (one part of logwood in three of water), then superficially dried and placed in a hot solution of copperas (one part of copperas to thirty of water they will in twenty-four hours be dyed a beautiful black.

A solution of one part of picric acid in sixty of water, with ammonia added until perceptible to the nose, dyes the veneers a yellow which is not affected by subsequent varnishing; and coralline dissolved in hot water, to which a little caustic soda and one fifth of its volume of soluble glass has been added, produces shades of rose color differing with the amount of coralline used.

### The English Patent Laws.

The Select Parliamentary Committee on the Patent Laws have agreed to certain resolutions which they will recommend as the basis of legislation on the subject. They state that the privilege conferred by letters patent promotes the progress of manufactures by causing many important inventions to be introduced and developed more rapidly than would otherwise be the case; and it does not appear to them that the granting of pecuniary rewards could be substituted with advantage to the public interest for the temporary privilege conferred by letters patent. At the same time, the existing laws are defective and require improvement; and the Committee think that protection for a limited period, and dating back to the time at which it was applied for, should only be granted for an invention on its nature and particular points of novelty being clearly described in a provisional specification, and upon the report of a competent authority that such an invention, so far as can be ascertained by such authority, is new, and is a manufacture within the meaning of the law. They further consider that all letters patent should be subject to the condition that the manufacture should be carried on within the United Kingdom, and that it shall be carried into effective operation, within a reasonable time from the granting of the patent, by the patentee or his licencees.—*Pall Mall Gazette.*

### On the Heating of Steel.

We believe that overheating has condemned splendid steel more frequently than anything else. "*Make it well hot that it will work easier*" is a common saying, and sounds well in the shop; but when heating steel, don't follow the advice, for although it may seem to work easier when overheated, the error committed thereby will soon become apparent. All cast steel (excepting the comparatively new article, "chrome cast steel," which has properties entirely its own) requires the most careful heating. The fire must be regulated by the size of the work; and in heating the steel, beat the coals around the outside of the fire as soon as the flames begin to break out in order to prevent the heat from escaping. To save fuel, damp the coal and throw water on the fire if it extends beyond its proper limits.

To ascertain the heat of the steel, draw it out of the fire, and that often; for it requires to be well watched to heat it properly, and if not hot enough, thrust it in quickly again; but be careful not to use a higher degree of heat than is absolutely necessary to effect the desired purpose, and to use as few heats as possible. Steel is, essentially iron with a larger ingredient of carbon; therefore, too frequent heating or overheating burns out the carbon, and thus spoils its valuable character. Many smiths have the idea that so long as the steel does not fly to pieces when they strike it with the hammer, it is not too hot; but this is an erroneous idea, and easily proved when it comes to be hardened, and when it is brought into use. We therefore say again, that no forger can be too careful in the heating process, and when he takes the heats. The practical eye will soon learn when it is heated properly for forging. But few forgers will admit that they spoiled the work by overheating, and yet this is unfortunately most frequently the case.

ON THE WELDING OF CAST STEEL.—For welding cast steel, a flux is required in order to prevent oxidation of the surfaces to be joined. For this purpose, use a composition consisting of sixteen parts of borax and one of sal ammoniac, which has been boiled together over a slow fire for an hour, and when cold, ground into a powder. The steel is first heated a little, then dipped in the flux, and the heating continued until the metal has attained the proper heat. The flux is then fused over the surfaces, and has dissolved any oxide of iron which may have formed. The two surfaces to be joined are laid together and struck continuously, working toward the edges in order to expel the flux and insure a perfect union of the metal. Shear steel is joined to wrought iron without difficulty; but when cast steel is to be welded to wrought iron, the greatest care is required, or else no sound welding will be effected. By using the above mentioned flux, it can be done; but in all cases where steel is to be joined to iron, the steel—no matter what kind—should never be heated to so high a degree of temperature as the iron.—*The Hub.*

### Secondary Batteries.

It is well known how the Leyden jar discharges, in one strong spark, the sum of electricity it received from the electric machine. M. Planté connects a somewhat analagous apparatus with the voltaic pile. Two plates of lead (20in. long by 8in. wide) are rolled up in spiral, being separated from each other by a few strips of india rubber. This spiral is placed in a jar containing acidulated water, and having a gutta percha cover, on which are fitted binding screws connected with the plates. Twenty such elements are placed in two rows of ten each, and charged from the primary battery, which consists of two Bunsen couples. By means of a commutator of peculiar construction, these secondary elements may be connected either for quantity or for intensity. When the elements are joined in series, an electromotive force equal to thirty Bunsens is obtained, giving a current by means of which platinum wire may be fused.

In the secondary couples, the chemical action generating the current is the reaction of hydrogen on peroxide of lead, the current from the primary pile, having caused decomposition of the water, oxidizing one of the plates and developing hydrogen on the other.

By the above arrangement, the quantity of electric work from the direct action of the primary pile is transformed by condensation. This case is somewhat similar to that of a hydraulic press or crane. In a pile driver, *e. g*, a heavy body, raised by degrees to a great hight by a series of successive efforts, is then left to itself, and gives back at once the greater part of the work thus expended on it. So, when, after charging, the secondary circuit is closed, the sum of the accumulated chemical actions caused by the primary current is given out in the form of a very intense current of short duration. The effect, when the couples are joined for quantity, corresponds to the fall of a very heavy mass raised a small hight; when joined for intensity, to the fall of a small mass raised to a great hight. It is not difficult to see how these secondary piles may become of important use.

### The Mastodon Bones.

At a recent meeting of the Cornell Natural History Society, Mr. Seybolt read a paper on the skeleton of the mastodon lately exhumed on the farm of A. J. Mitchell, near Otisville, Orange county, N. Y. The facts of the case were drawn from the personal observation of the speaker, and were consequently listened to with much interest. The skeleton was discovered December last in a deep wet swamp. The bones found up to the 1st. of April were the ribs, vertebræ, head, pelvis, and bones of the forelegs, indeed all the bones except those of the hind legs, lower jaw and tusks, which undoubtedly will be found ere long. The head is of astonishing size and measures three feet seven inches across the top and over four feet in length. Of the teeth, the back tooth extends seven inches along the jaw and has a width of three inches. The tusk holes are seven inches in diameter and extend three feet into the head. The shoulder blades are each two feet in length and about the same in breadth. And the ribs, some thirty in number, measure in the longest between five and six feet. The pelvis bone, which was taken out entire, measures in its greatest extent five feet seven inches. The skeleton as a whole is supposed to be the largest yet discovered. When set up, it will be fourteen feet in hight and twenty-five feet in length. Twigs of coniferous trees, leaves and other vegetable matters were found between the ribs, and tufts of dun brown hair from two to seven inches in length were found outside. Concerning the deposits in which the skeleton was found, the upper layer, from five to fifteen inches in thickness, consisted of common black swamp dirt; beneath was a layer of coarse, fibrous peat quite dry in its character and varying from two to four and a half feet in thickness; below this was a stratum of coarse marl, a foot in thickness, then a curious layer of grass, matted and quite well preserved; then another layer of marl, below which appeared the clay which is supposed to underly the region roundabout. The bones were found chiefly in the lower strata, but a few occurred in the upper. The swamp is at the eastern base of the Shawangunk mountains, and the under stratum sloped eastward, disclosing sea washed cobble stones and marine shells. The bones are of a brownish color, being undoubtedly impregnated with oxide of iron. No disposition has yet been made of the skeleton, but it will be sold to the highest bidder.—*Cornell Era.*

### Adulterations.

While it is very difficult, and perhaps almost impossible, to detect the finer kinds of adulteration in the case of liquors, we are fortunately able to follow the adulterator of the ordinary articles of food, and to detect his practices with certainty. Add perfectly odorless spirit to brandy, and although the adulteration is notable and profitable, it is beyond the reach of the chemist. Add chicory to coffee, and although the chemist fails to point it out with certainty, the microscopist is not so easily balked. Before the searching power of this wonderful tube, the secret operations of the adulterator become as obvious as if performed in full view; for the microscope reveals to us the ultimate structure of the different vegetable and animal substances, and as each has its own well marked characteristics, it is as easily recognized by the expert as are the faces of his friends by an ordinary observer. No one who has ever seen potato starch could readily mistake it for anything else; chicory and coffee are so unlike that the difference is instantly perceived, and the smallest addition of either one to a sample of the other is readily detected. So, too, in regard to many sophistications of a purely chemical character. Red lead, added to vermilion, is easily separated; sulphuric acid, or oil of vitriol, when used for the purpose of increasing the strength of vinegar, is readily recognized; sugar, when adulterated with sand, may easily be made to give positive evidence of the presence of the latter; the coloring matter employed for the purpose of converting worthless tea leaves into the "best" green tea, may without difficulty be identified; and the mineral matter, such as *terra alba*, or farinaceous substances such as wheat, corn or potato starch, used for the purpose of increasing the bulk and weight of confectionery, may be determined. There is a wide range of cases in which adulterations may be detected with ease and proved with certainty. Some of the tricks of the wily adulterator show a marvellous ingenuity. Thus some persons, knowing that most ground coffee is adulterated, never buy the ground article, but always procure the whole beans, which they either grind themselves or get ground. To meet this case, the adulterator makes up a paste of ground chicory, pea flour, and other cheap materials, and molds it, by machinery, into the form of the beans. These artificial beans are rolled in a barrel until smooth, roasted to the proper color, and mixed with a small proportion of genuine beans, to give them the true coffee flavor. The fraud is of course easily detected, as such beans quickly fall to powder when soaked in water; but this example shows the ingenuity and painstaking of the fraudulent classes, who often spend, in efforts to cheat, an amount of labor and ingenuity that, if devoted to some honest undertaking, would be certain to insure success

Any attempts to suppress the practice of adulteration must be based upon certainty of exposure and punishment. How many children are robbed of their due amount of nutriment by the vile practice of watering milk? How often is the physician disappointed in the effects of the medicines that he prescribes, simply from the fact that these medicines are not pure, some dishonest and avaricious druggist having adulterated them with cheaper and less potent materials, in order that he might make a little gain?

We feel satisfied that the practice of adulteration will never be completely and permanently checked until the government takes the matter fairly in hand, and enacts efficient laws looking to the detection and punishment of this crime. —*Professor Phin, in Good Health.*

A SCHOOL house in Copenhagen, Denmark, is furnished for 1,000 children; one session is held in the morning, 1,000 attending, and a second in the afternoon, 1,000 attending, both schools being under the same general management. The system secures a happy union of bodily and mental exercise, the scholars working half the day.

A NEW tin tea kettle takes a longer time to boil than an old one, because the bright surface reflects or throws off the heat of the fire; but the old one, having a dark surface, absorbs the heat.

### Improved Cooking Vessel.

For some time past, we have employed in our domestic establishment one of Warren's improved cooking vessels, and find it to be an important and valuable addition to the culinary service. It is, in fact, an automatic cook, and performs its allotted duty with a great deal better judgment and far less fuss than the best forty dollar a-month French cook that ever officiated over a stew pan.

The patent cook consists of a series of combined vessels, and, in using it, you simply place your roast beef, steak, mutton, ham, fish or game and the various vegetables, each in its separate division, and set the vessel on the fire; where it remains for a specified time without any attention. It cannot burn, over do or under cook, but when the time is up, you have the finest cookery that can be imagined, executed on strictly scientific principles. That is to say, the cooking is done at a temperature of not over 210° Fah., which, according to Liebig, is the correct heat. A higher temperature coagulates the albumen and renders meats tough and stringy. This machine is not a steamer but a roaster; but you can make it a steamer, if desired, by shifting one or two of the covers.

By the ordinary methods of cooking, one third of the original weight of the meat is lost by the evaporation of the juices; but with this improved device this loss is to a great extent prevented, and the cooked food is greatly improved in quality. Made by the Newport Lead Works, Newport, R. I.

### A Hint to Nurses.

You know what a racket is caused, even by the most careful hand, in supplying coals to a grate or stove, and how, when the performance is undertaken by the servant, it becomes almost distracting. If you don't remember, take notice the first time you are ill, or you have a dear patient in your care, or the baby is in a quiet slumber. Let some one bring on her coal scuttle or shovel, and revive your recollection. Well, the remedy we suggest is to put the coals in little paper bags, each holding about a shovelful. These can be laid quietly on the fire, and, as the paper ignites, the coals will softly settle in place. You may fill a coal scuttle or box with such parcels, ready for use. For a sick room, a nursery at night, or even for a library, the plan is admirable. Just try it. Besides, it is so cleanly. If you don't choose to provide yourself with paper bags, you can wrap the coals in pieces of newspaper at your leisure, and have them ready for use when occasion requires.

### Preparation of Beet Leaves for Fodder.

Méhay maintains the entire success of his method of so preparing the leaves of the beet as to render them capable of preservation for several months as fodder, and at the same time greatly improving their qualities as food for cattle. The method consists simply in placing them in baskets and immersing them in a tank containing diluted hydrochloric acid of 4° of Beaumé. The result of this is to greatly condense the volume of the leaves, and to render it necessary to add more fresh ones to fill up the basket, which has to be again immersed, and finally allowed to drain off. The leaves may then be placed in beds, in dry earth, and kept until needed for use. According to a report of a committee who examined the results of this process, domestic animals become extremely fond of the leaves thus prepared; and, indeed, milch cows fed with them are said to give a large increase of milk, with a decided improvement in the quality of the butter. The tendency to diarrhœa in cattle produced by the fresh beet leaves seems not to be developed by this prepared fodder, and for this and many other reasons it is strongly recommended to agriculturists.

### Source of Nitrogen in Plants.

It is well known that the quantity of nitrogen contained in the crops exceeds in enormous proportion that existing in the manures, the excess undoubtedly being derived from the air. It is now a question whether this is extracted directly from the air by plants, which would thus have the power of assimilating directly, or if it is first taken from the air by the soil, so as to combine with organic matter and form an assimilable compound. According to Deherain, oxygen, in the presence of organic matter, combines directly with nitrogen to form a compound analogous to the humus of the earth, or to ulmic acid. To illustrate this, he placed in a tube oxygen, nitrogen, glucose, and ammonia. On drying the tube and heating it, a black, nitrogenized matter was left, and a portion of the nitrogen in the tube was found to have disappeared.

REGULATING THE HATCHING OF SILKWORM EGGS.—Duclaux, after a careful observation of the external conditions which favor and influence the hatching of the eggs of silkworms, has prepared the following rules, by attention to which it is said that the development of the eggs can be regulated at will. First, to prevent an egg from being hatched at the usual time, it must be kept, from the period of being laid, at a temperature between 59° and 63° Fahr., and then exposed fourteen days to cold, three months before the time at which the hatching is desired, being subsequently treated in the usual manner. To cause an egg to hatch before the usual time, it must be exposed to cold twenty days after being laid, and kept in that condition for two months, and then removed. Six weeks later it will be in the same condition as ordinary eggs, and can be treated in the same manner. In this way it is possible to have silkworms ready for hatching at any season of the year.

THE actual duration of a flash of lightning does not exceed the millionth part of a second. But the retina of the human eye retains the impression of the electrical flash for a much longer period.