Correspondence

Light Locomotives—Traction on Inclines.

MESSRS. EDITORS :—The numerous passenger railways in and around our city, and tram roads about our coal pits and oil wells in this region, give the following question great importance, viz. :—In what degree is the power or draft of a locomotive affected by the gradient of the track ? Our roads are mostly pretty steep, but the desire is to dispense with horse power on them wherever it can be done, and to introduce in its stead small locomotives of from four to eight tuns in weight with four wheels—all drivers ; and the question is on what grade will this be practicable ?

The diversity of opinion on the subject is wonderful. Some affirming that on a grade of over one foot to the hundred locomotive power would be impracticable ; others that on a grade as high as even four or five feet, it would be both practicable and profitable for light drafts, as passenger railway cars. Especially so if the locomotive were not too heavy and all the wheels drivers.

It struck me that the question is one of such immediate practical importance that it must have been solved long since, and reduced to certain and fixed rules, and that many of your host of readers can, if they will, refer us to where we can find the desired information, or can give us the fruits of their own experience. JAMES SCOTT.

Pittsburgh, Pa., Sept. 7th.

[The arithmetical rule for ascertaining the traction of an engine in pounds is to multiply the area of the cylinder in inches, by the pressure per square inch on the piston, this product by the length of stroke in feet. and divide by the diameter of the driving wheel in feet. Or if the length of stroke be taken in inches the diameter of the driving wheel must be expressed in inches also. The principal element of traction is the rate of evaporation in the boiler. The Pennsylvania Central Railway from Altona to Gallitzin has a grade averaging 87½ feet per mile ; the grade on the New York Central between Albany and Schenectady is 65 feet per mile for three miles ; and the Western Railroad of Massachusetts has several grades ranging from 55 to 83 feet per mile. On the Caledonian Railway in Scotland there is a very long incline on which the rise is one foot in 76, or about 68 feet per mile. Mr. D. R. Clark has driven the ordinary passenger engine with 15-inch cylinder and 20-inch stroke, with 6-feet driving wheels up this grade at the rate of 20 miles per hour. The engine tender and train weighed 70¼ tuns. The pressure in the boiler was 90 lbs. per square inch : on the pistons 47½ lbs. per square inch, and the evaporation in the boiler was at the rate of 87 cubic feet per hour. The most elaborate and practical article on the traction of locomotives that has appeared lately is by Zerah Colburn in the London *Engineer* of July 4 and 11, 1862. The examples which we have cited will convince all those who think that a grade of over one foot to the mile is impracticable, that they are in error. We will cite another case to the point respecting small locomotives, such as those mentioned for street railways. There is a locomotive now running on a short line of tram railway near Whitburn in Scotland, and it takes loads of 24 tuns up an incline of 1 foot in 40 at the rate of eight miles per hour. This engine has cylinders only 8 inches in diameter ; stroke 15 inches ; four wheels coupled, 27 inches in diameter, and its total weight in working trim is about 7 tuns. This little engine draws loads on grades of 3 feet in the 100, and may be a practical guide to those who wish to apply such a class of locomotives in place of horses on city railways.—EDS.

Action and Re-action.

MESSRS. EDITORS :—When two bodies one of which has double the mass of the other are free to move and acted upon by a force between them so as to give them motion in opposite directions, the velocities which they receive will be inversely as their masses. This is capable of easy proof by experiment, and what is as much to our purpose of as easy disproof by the theory of the effects of force. But let us regard the phenomenon until we are satisfied that it harmonizes perfectly with some known truths. Neither body having any velocity at the commencement of the time during which the force acts upon them and their terminal velocities being related as one to two, their average velocities must bear the same relation. But if the average velocity of the one through a certain length of time has been twice that of the other then the distance through which it has moved during the action of the force is double that gone over by the other. A body free to move and having force expended upon it in overcoming its inertia, will possess by virtue of its velocity a force exactly equal to that consumed in giving it motion. The measure of the consumption of force is its intensity multiplied into the distance through which it acts. Since in this case the force has acted with equal intensity upon the two bodies, but through unequal distances, the forces expended upon each, and hence that possessed by each will be to the other in the same ratio as are the distances through which they moved during the action of the force viz., one to two. Now when we reflect that the living force of a moving body is as the mass multiplied into the square of its velocity, and so a body whose weight is one and velocity two will possess twice the force of one whose weight is two and velocity one, we will see an entire accord between the theory—so much of it as has been stated—and the practice. But I have already said there was a discord and to the question where is it ? With modesty let me reply that in the experiment above mentioned and in all similar ones action and re-action appear to be to each other inversely as the masses of the bodies. But the fundamental principle of mechanics is that action and re-action are always equal. By no means do I ask that an honored and so far as we are informed until now an unquestioned aphorism of philosophy, be discarded, but will be thankful to the scientific public for instances in which in any true sense of the words action and re-action when between bodies of unequal masses are equal. Those supposed examples of the action of the principles in question given in numerous books of great merit should, so far as I have examined, produce doubt rather than conviction, of which I will be pleased to attempt the proof whenever called upon ; but if in the above I have so entirely misapprehended as to render answer unmerited I crave pardon for the obtrusion. ISAAC E. CRAIG.

Cleveland, Aug. 3, 1863.

The Way to Make Chlorate of Potash.

MESSRS. EDITORS :—Would you be so kind as to let me know through your paper the cheapest method known of making chlorate of potash—the commercial kind. I should like to know, first, the materials ; second, their exact proportions ; third, the trade process. A SUBSCRIBER.

Catasauqua, Pa., Sept. 1, 1862.

[Chlorate of potassa is produced on a large scale by the following method, which has been found to answer better than any other. One part of chloride of potassium and two parts of hydrate of lime are reduced with water to a thin cream, and chlorine gas—prepared in the ordinary way from binoxide of manganese and hydrochloric acid—passed through the menstruum till it assumes a pinkish color, which is due to the formation of traces of hypermanganic acid. A little manganese passes over during the operation, and when no more chloride is required for the alkaline bases, water is decomposed and hypermanganic acid produced. The annexed equation represents the principal change :—

$$\underbrace{KCl}_{\text{Chloride of potassium.}} + \underbrace{6\,CaO}_{\text{Lime.}} + \underbrace{6\,Cl}_{\text{Chlorine.}} = \underbrace{KOClO_5}_{\text{Chlorate of potassa.}} + \underbrace{6\,CaCl}_{\text{Chloride of calcium.}}$$

The vessel holding the solution is of any convenient form, and is provided with agitators of all shapes and sizes, depending upon the whim or caprice of each manufacturer. It is connected with a similar one containing a fresh charge of the same materials, by means of a waste pipe, through which all the escaping gas passes to be there absorbed. When the liquid in the former is ready to be drawn off, the gas is made to enter the latter, and the connecting pipe between the two cisterns takes the unabsorbed chloride to the first vessel, which when empty, is refilled immediately, so that very little time or gas is lost. The saturated liquor is, when drawn off, evaporated to 34° Twaddell, and the mother lye to 46°, if two crops of crystals are desired ; if only one, then the menstruum is at once evaporated to 60°. The crystals, after being well washed, are drained on a cone having a small aperture at the bottom, and are afterward dried upon iron plates heated by steam. The chloride of calcium is the only other compound present. Some manufacturers re crystallize them, so as to produce a first rate article. The principal manufacturers of this salt are, Albrights, of Birmingham, Gambles, of St. Helen's, James Muspratt and Sons, of Liverpool, and Frederic Muspratt, of Woodend, near Warrington, Lancashire. The annual production is nearly five hundred tuns. The principal use to which it is applied are in bleaching, making lucifer matches, and for pyrotechnic purposes.—EDS.

The Formation of the Whirlpool.

MESSRS. EDITORS :—In the SCIENTIFIC AMERICAN of Aug. 30th., Mr. R. S. Stevens requests to know the cause of the circular motion or whirl of water when running out of a vessel of any size or form, as a common pail, through an orifice in the center of the bottom to which is attached a piece of tube, and also why the discharge of the water is accompanied by the forcible passage of air through the tube. The following has occurred to me as an explanation :—The water that first escapes is that immediately over the tube which descends by its gravity, the remainder resting on the bottom of the pail. As the column descends its place is partly supplied by the particles of water lying next to it and nearest the surface, these in turn as they descend are replaced by the particles lying next to them, and so on until the vessel is empty ; but the descending column of water is not entirely replaced by the adjacent particles and presently the amount of water passing out is not sufficient to fill the tube, when owing to slight inequalities in the tube the water does not flow evenly down the sides, nor does it flow in a body down on one side, but passes down in a spiral course, causing the water to whirl sometimes to the right and sometimes to the left I have seen it whirl in both directions ; the air which fills up the space unoccupied by the fluid is drawn—sometimes quite forcibly—through the tube by the spiral motion of the water. Might not the same principle be applied to ventilating purposes by causing a spiral flange, fitting air-tight in a cylinder to rotate rapidly, thus causing a current of air to pass through the cylinder ? A. H. WARD.

Philadelphia, Pa., Aug. 23, 1862.

Rifle Sights---Dead Black on Brass.

MESSRS. EDITORS :—I have been informed that the dead black on the eye pieces and interior of French spyglasses is produced with the nitromuriate of platinum, platinum dissolved in a mixture of aquafortis and muriatic acid.

The best open sights for a rifle in my opinion, consist of a back sight with a right-angled dead black notch in it, and a front sight of silver. But the globe sight is superior to notched back sight, and it may be used nearly as rapidly as the open sight.

L. F. M.

Rochester, N. Y., September 7, 1862.

The Resistance of Swinging Plates.

MESSRS. EDITORS :—The soundness of your opinion in regard to the resistance of swinging plates to the impact of cannon shot was proved by experiments made here a few years since. In firing at plates of different thicknesses with guns of caliber varying from 6 to 68 lbs. the plates were merely set up on one end without support, and received almost the full damage of the shot. The 68-pound ball penetrated some distance, and broke completely in two, a tough 5½ or 6-inch plate thus placed. S. D.

Preserving Wood by Salt.

MESSRS. EDITORS :—Some time ago you had an article in your paper in relation to the preservation of timber. I wish to state here what I have done and seen others do, and it has always had a good effect, and I want you to state what you think of it, and whether you can give any scientific reason for it. I have used common salt for the preservation of mill shafts or water-wheel shafts, and it has had a good effect in staying the decayed timber. Take a two-inch augur, bore holes into the stick of timber, and fill up with salt, and then plug up the holes tight. In a large stick of timber like a water-wheel shaft, bore a hole through the center like a pump, and fill up with salt and plug up, and there is no telling how long this may last, as it has been tried with us, and has answered very well. No man would believe what effect it will have till he tries it. I have used it in a mill shaft that was decaying, and it certainly has helped it wonderfully. I have never seen a salt barrel but what was sound, and will stand more wet weather than any other barrel or stave of its kind.

JNO. B. SIMONS.

Brush Valley, Ind., August 21, 1862.

The Way Military Engineers are Educated in France.

Dr. Kennedy, President of the Polytechnic College of Pennsylvania, having at the request of Governor Curtin, visited thefamous military engineering school at Metz, gives the following account of it; for a copy of which we are indebted to Prof. Dwight D. Willard, of the Polytechnic College :—

METZ, July 30, 1862.

To their Excellencies Governor Curtin, of Pennsylvania, and Governor Ogden, of New Jersey—GENTLEMEN :—The readiness with which you have ever executed measures calculated to improve militaryeducation in your respective States, as well as the interest you have been pleased to express in the Polytechnic College, Philadelphia, over which I have the honor to preside, prompts me to lay before you, in advance of my return, a few of the facts learned by a visit to the School of Artillery and Engineering here. This quaint old town, which is famous for the strength of its fortifications, and which has a military renown dating antecedent to the discovery of America, is, as you know, one of the great fortresses of France on the German frontier, off the favorite routes of the towng. It is seldom visited by our countrymen and is but little known at home, although we often hear of St. Cyr, near Paris, the seat of a School of Infantry and Cavalry merely. No Frenchman can enter as a student here unless he has first graduated at the Polytechnic School in Paris. The theoretical portion of the course must indeed have been completed there. The instruction here is of the highest grade and essentially practical. The average age of the students is about twenty-one years. Their number varies with the wants of the service. During the Crimean war it ran up to 150; it is now, including eight *externes*, 126; of these *externes* it is simply necessary to say that they are admitted as an act of courtesy toward the foreign nations to which they respectively belong, and that they do not lodge with the regular students. These are divided into two grades, whom we may call first-year men and second-year men, one being admitted during each of the two years which constitute the course. These are again divided into artillery men and engineers, making actually fourclasses, although, as the studies of the artillery men and engineers are frequently the same the classes are often united. This school, as well as the School of Mines, the School of Roads and Bridges, the School of Naval Engineering, &c., is annually recruited from the graduates of the Polytechnic School at its annual commencement, in the following manner :—These graduates are divided according to their averages, into four grades. The members of the highest grade have the first chance of vacant scholarships in the professional schools. The members of the second and of the other lower grades, must necessarily take the scholarships left by the grade next above them, and as there are always fewer scholarships than there are graduates of the Polytechnic the competition is active, and the government saves itself the expense of further educating men of insufficient energy and intelligence. These must retire to private walks of life. Students who choose the school at Metz receive per annum 1,600 francs and their lodging, which is of the best description. Upon completing their curriculum they are commissioned as lieutenants. This curriculum consists of courses on military art, on military administration and on field fortifications; of a course on science as applied to the military art, in furnaces, foundries and the casting and working of the metals, &c.; a course on military architecture and the construction of permanent fortifications whether of stone, iron, earthwork, &c.; of a course on topography and geodisy; a course on applied mechanics, and on design; a course on the study of the horse (hippentrigue), his history, habits, breeds, training, &c., and a course on the German language. A good idea of the thoroughness, as well as the practical character of the instruction may perhaps be conveyed by reference to that on design. Here all must be original; drawing from copies is forbidden. The Professor gives a general specification, say of a permanent fortification to all the class, varying slightly with each member, who, before he leaves the exercise, must draw a definite plan. If this is approved, he is on the subsequent days to prepare enlarged working drawings of his ideal construction, in elevation, ground plan, and section, and accompany them with descriptive text. From the plan of field fortifications presented by the class one is selected for construction. The facines are cut, gabions made, sand bags filled, trenches dug, traverses and embankments executed by the class, the humbler as well as the higher duties being performed by the students. Afternoons are devoted to practical exercises, of which the maneuvers with the artillery constitute an important part. These are begun in a large building with graveled floor. One party of students draws the guns, another performs the manual, sponging, loading, &c. The scene is afterward changed to the large practising ground where horses are attached to the guns, and the movements more nearly resemble those of actual battle. Other illustrations might be adduced under this head if necessary. It is almost useless to say that a corps of engineers is, according to all good authority upon the subject, the most effective representation of a standing army that a free state can maintain. It is also the cheapest, from the smallness of its number, and the safest, from the intelligence and character of its members. It constitutes a nucleus around which may be rallied at any time all the other corps of a large army, and a camp of instruction with competent officers be at once formed. Happy am I to know that men able to form such a nucleus have gone out from the Polytechnic College, and are now officers in the regiments of Pennsylvania and New Jersey in the war for the Union. Most happy shall I be if the examination I am now making of the military schools of Europe may serve still better to adapt our American institutions to supply the military necessities of the loyal and noble commonwealths over which you preside.

Very respectfully, your obedient servant,

ALFRED L. KENNEDY.

Confusion about Horse Power of Engines.

The following sensible comments on the subject of horse power are from the London *Engineer* :—

At present not less than six different rules are adopted in different places, and by different makers, nearly all giving different results; thus, strange as it may seem, in Glasgow an engine is not the same power that it is in Leeds or London. Mr. Fairbairn calculates the power of his engines by "multiplying the area of the piston by 7 lbs. the square inch, and by 240, the speed of the piston in feet per minute." The Admiralty rule is, "multiply the square of the diameter of the piston in inches, by its velocity in feet per minute, which must be as follows :—For a 4-foot stroke, 196 feet per minute; for a 5-foot stroke, 210 feet per minute; for 6-foot stroke, 222 feet; for 7-foot stroke, 231 feet; for 8-foot stroke, 240 feet per minute, and divide the result by 6,000." Boulton and Watt's formula is 33,000 lbs. raised 1 foot in a minute; but, strange as these rules may seem, they yield to the Leeds, Manchester and Glasgow rules, which are at the first place to allow sixteen circular inches, at the second ten square inches, and at the last ten circular inches of piston area per nominal horse power: these last rules at least show the most delightful simplicity if they have no other merit; but we might as well try to calculate the power of an engine from the diameter of the piston rod or the weight of the flywheel. The *Persia's* engines, with 10-foot stroke and 101-inch cylinders, are called 818-horse power. While the *Warrior's*, with 112-inch cylinders, which, deducting the 41-inch trunk, are about equal to 103 inches, are called 1,250-horse power, though they have but 4-foot stroke; and we would not weary our readers by heaping up instances to prove what we believe is pretty well known, that the term "nominal horse power" is useless and unexpressive, and it is in vain to say that a standard is necessary when we are at this moment doing very well without one. No engineer can tell from the mere size alone, of an engine, whatits power may be. All the purchaser requires to know are the actual dimensions of his engine and boiler, and the quality of the fuel he is about to employ, in order to calculate what amount of work it is capable of performing. It is thus that locomotives are bought and sold without the use of any such absurd term, the use of which must often lead to confusion in the mind of the purchaser, who is seldom very well up in these matters. Its use gives an opening to the fraudulent dealer, in an engineering point of view no such term is necessary, and the present multiplicity of arbitrary rules are quite unsuited to the commercial requirements of the age.

Never Too Old to Learn.

Socrates, at an extreme age, learned to play on musical instruments, for the purpose of resisting the wear and tear of old age.

Cato, at eighty years of age, thought proper to learn the Greek language.

Plutarch, when between seventy and eighty, commenced the study of Latin.

Boccaccio was thirty years of age when he commenced his studies in polite literature, yet he became one of the three great masters of the Tuscan dialect, Dante and Petrarch being the other two.

Sir Henry Spelman neglected the sciences in his youth, but commenced the study of them when he was between fifty and sixty years of age. After this time he became a most learned antiquarian and lawyer.

Colbert, the famous French minister, at sixty years of age returned to his Latin and law studies.

Ludovico, at the great age of one hundred and fifteen, wrote the memoirs of his own times. A singular exertion, noticed by Voltaire, who was himself one of the most remarkable instances of the progress of age in new studies.

Ogilby, the translator of Homer and Virgil, was unacquainted with Latin and Greek till he was past fifty.

Franklin did not fully commence his philosophical pursuits till he had reached his fiftieth year.

Accorso, a great lawyer, being asked why he began the study of law so late, answered that indeed he began it late, but he should therefore master it the sooner.

Dryden, in his sixty-eighth year, commenced the translation of the *Iliad;* and his most pleasing productions were written in his old age.

Salt and its Offices.

Some modern agricultural writers have doubted the necessity of giving animals salt. The remarks as to the effect of salt upon health, by Professor Johnston, may be relished by those who still put salt in their own puddings, and allow their cattle a little now and then. He says :—

The wild buffalo frequents the salt licks of Northwestern America; the wild animals in the central parts of South Africa are a sure prey to the hunter who conceals himself behind a salt spring; and our domestic cattle run peacefully to the hand that offers them a taste of this delicious luxury. From time immemorial, it has been known that, without salt, man would miserably perish; and among horrible punishments, entailing certain death, that of feeding culprits on saltless food is said to have prevailed in former times. Maggots and corruption are spoken of by ancient writers as the distressing symptoms which saltless food engenders; but no ancient or unchemical modern could explain how such sufferings arose. Now we know why the animal craves salt, why it suffers discomfort, and why it ultimately falls into disease if salt is for a time withheld. Upward of half the saline matter of the blood (75 per cent) consists of common salt, and as this is partially discharged every day through the skin and the kidneys, the necessity of continued supplies of it to the healthy body becomes sufficiently obvious. The bile also contains soda as a special and indispensable constituent, and so do all the cartilages of the body. Stint the supply of salt, therefore, and neither will the bile be able properly to assist the digestion, nor allow the cartilages to be built up again as fast as they naturally waste.

Improved Coal Oil Pyrometer.

Petroleum is a mixture of a large number of hydrocarbons, some of which are solid, others are liquid, and others are gaseous at moderate temperatures. All are combustible, but those are most inflammable which are most volatile. None are explosive, but if the vapor of rock oil is mixed with oxygen or with atmospheric air in certain proportions, an explosive compound is formed by the mixture. In the process of preparing the rock oil for illuminating purposes, there is sometimes so large a portion of the light hydrocarbons left in the liquid, that the evaporation at moderate temperatures will be sufficient to form an explosive compound, and when this is the case the storage and shipment of the oil or its household use becomes exceedingly dangerous.

Since the vast increase in the production of rock oil, and its extensive substitution for other oils, camphene, &c., it has become very desirable to have some means of readily testing any particular oil, in order to ascertain whether there is danger or not of its producing explosions.

Accordingly several of the leading coal oil dealers applied to Guiseppe Tagliabue, a thermometer maker of this city, whose instruments, commended by the arctic explorers, Drs. Kane and Hays, have given him a world-wide reputation, and requested him to construct an instrument for the purpose. He accordingly gave his attention to the matter, and produced the neat and effective instrument illustrated in the annexed engravings.

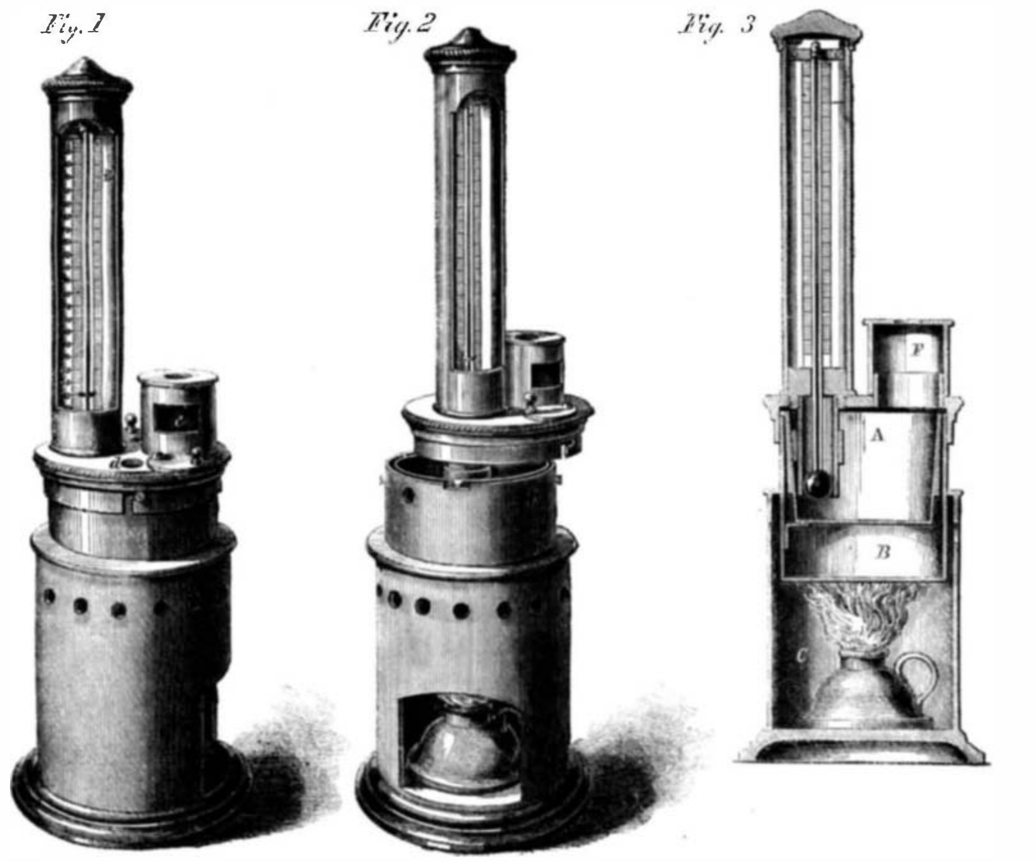
This instrument goes practically and directly to the point desired to be ascertained, and shows the temperature at which any oil produces an explosive mixture, as well as the temperature at which the liquid oil will be ignited by the contact of flame.

Fig. 1 of the engravings is a perspective view of the instrument as prepared for testing the temperature of the oil at the explosion of the vapor. Fig. 3 is a vertical section of the instrument as thus arranged, and Fig. 2 represents it as prepared for measuring the inflaming point of the liquid.

The oil is contained in a cup, A, which is fitted into an outer cup, B, that is partly filled with water, so that the oil may be heated in a water bath. These cups are supported in a brass cylinder, C, which has an opening in one side for the reception of a spirit lamp. The lamp being lighted, the oil is gradually heated, giving off vapor with a rapidity proportioned to its volatility. This vapor is mingled with air entering through the orifices, *d d*, (See Fig. 1,) thus forming an explosive mixture which fills the cylinder, F. By frequently introducing a lighted taper through the opening, *e*, (again see Fig. 1,) in the cylinder, F, during the process of heating, the exact time at which the vapor is rising with sufficient rapidity to form an explosive mixture is ascertained by a slight explosion taking place. The temperature of the oil as indicated by the thermometer is now observed, and thus the very lowest temperature at which the oil will form an explosive mixture under these conditions is positively ascertained.

To determine the temperature at which the oil itself will ignite on contact with the flame, the cover is removed from the cup, A, by turning it partially around as shown in Fig. 2, the bulb of the thermometer still resting in the oil. The oil is now repeatedly tested as it is being heated, by touching a lighted taper to its surface, and when it begins to burn its temperature at the ignition point is observed by the thermometer.

The cover, with its connections, the thermometer and cylinder, F, are made removable together, in order that if they become so heated in the course of an experiment as to disturb the indications, they may be cooled by being plunged in cold water. This feature is deemed of considerable practical importance by the inventor.

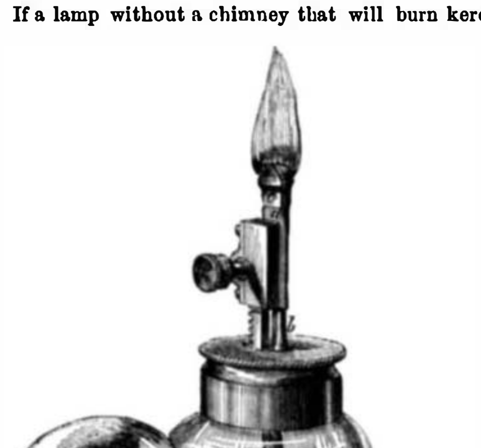


TAGLIABUE'S COAL OIL PYROMETER.

Further information in relation to this invention may be obtained by addressing the inventor, G. Tagliabue, at 298 Pearl street, New York.

MEUCCI'S KEROSENE LAMP.

If a lamp without a chimney that will burn kerosene oil without smoking is never produced, it will certainly not be from any want of ingenuity among our inventors, but from insurmountable difficulties in the thing itself. The devices which have already been suggested and tried seem to be innumerable, and new ones continue to come forth in endless succession. The lamp which we here illustrate we have tried ourselves, and find that it produces a small flame free from any perceptible smoke.



The improvement consists simply in embracing the wick by two platinum plates, one on each side, the hight of which is made adjustable; that of the wick remaining constant. The plates, *c*, (see the cut,) are soldered to the upper end of a sliding sleeve, *a*, which fits loosely upon the wick tube, *b*, and is moved up and down by means of a rack and pinion.

If the plates are turned down and the wick is lighted smoke will be given off, but by raising the plates the production of smoke is stopped and a clean white flame is produced.

The inventor says that other metals may be employed, though he has found no other so good as platinum. He has also discovered that a plate on one side of the wick only will prevent the formation of smoke.

This improvement was invented by Antonio Meucci, of Clifton, N. Y. It has been assigned to Antonio Jané, to whom the patent was granted Aug. 12, 1862, and for further information in relation to it inquiries may be addressed to Jané & Llanusa, 140 Water street, New York city.

Nitric Acid Stains.

Those who are engaged in chemical operations, either as amateurs or as practitioners, frequently use nitric acid, which stains the skin of the hands a deep yellow, and is so difficult of removal that it usually remains until the epidermis is renewed. M. Schwarz, in the *Repertoire de Chemie*, states that the best way to treat such stains is by an application of the sulphide of ammonium with the addition of a little caustic potash. By this means the coloring matter is not destroyed, but the burnt epidermis is converted into a soapy substance, which can be scratched off with a small piece of wood, the nail, or rubbed off with sand. By washing with a little dilute sulphuric acid, the skin becomes clean and recovers its natural whiteness. M. Schwarz believes that in some cases the above combination might be used as a caustic, and that its application might prove serviceable in certain affections of the skin.

Enormous and Wonderfully Accurate Scales.

Messrs. Sampson & Tibbits, of Green Island, N. Y., recently secured through the Scientific American Patent Agency, a patent on an improved scale for weighing at one draft a canal boat with its cargo, and we find in the *Waterford Sentinel* an account of the trial of the first of these scales constructed at Waterford on the Champlain canal. We quote :—

The canal boat *C. Bristol*, was loaded with pig iron at Fort Edward—the load when weighed on amounting to 188,166 pounds. The scale made it 834 pounds more, with about one-eighth or three-sixteenths of an inch more water in the boat than when her light weight was procured. The boat *W. W. Wright*, cleared at Whitehall last week, with 155,900 pounds of grain carefully weighed on, as reported by her master. The scale gave that weight precisely. The boat *Mountain Maid*, with a cargo of coal, weighed on at Rondout was weighed, the weights agreeing very nearly.

The beam is very sensitive, so much so as to require a nice balance. With a weight of 355,000 pounds on the cradle the removal of two pailfulls of wet oats was readily detected. A fifty pounds sealed weight added to that amount would give immediate motion to the beam, and the weight of a man could be, and was, almost exactly determined.

The scale weighs at one draft any weight between 100 pounds and 450 tuns.

General Kearney was not a West Point graduate. He entered the army as a volunteer in the cavalry.