IMPROVEMENTS IN THE ARTS AND SCIENCES.

There exists in England a Society for the encouragement of the Arts and Sciences, which numbers among its members many of the best and most talented persons in the United Kingdom. Prince Albert, when living, took an active part in the proceedings of this institution, and aided its objects by every means in his power. Whether it was the comfort of the working-classes which engrossed his mind, or whether the perfection of some rare and beautiful work of art, intended to give pleasure to more cultivated intellects, his energies, time and money, were equally interested and devoted to the fullest accomplishment of the duty in hand.

In pursuance of its object to encourage the arts and render Great Britain first in all that pertains to civilization, the Society offered premiums varying in amount from $500 to $100 for the best inventions or discoveries in the arts and sciences. They also publish lists of certain substances, articles, fabrics, instruments, machines, colors, processes, &c., &c., in daily use, which are to be the subjects of special premiums. For some improvements medals are offered, which it is supposed bear a high value; not so much, perhaps, for their intrinsic worth as for the honor conferred by them upon the recipient. We transfer to our columns a number of the subjects for which prizes are offered, not with the idea of inducing competition among our countrymen for the possession of the premiums, as that is not permitted, we believe, by the Society; but mainly with the object of placing before our readers, in pursuance of the design of the SCIENTIFIC AMERICAN, the latest and most pressing wants of the age we live in:

Goldsmiths' Work.—For the best essay on Ancient Goldsmiths' Work.

Bronzes.—For the best essay on the manufacture and casting of Bronzes, and on bronze washes.

Molds for Metal Casting.—For the production of a material to be used in the formation of molds for casting bronzes and other molten metals, so as to enable the casts to be produced without seams.

Pigments.—For an account of the various pigments used in the Fine Arts, with suggestions for the introduction of new and improved substances.

Substitute for Wood Blocks.—For the discovery of a substitute for the blocks used by wood-engravers, so as to supersede the necessity of uniting several pieces of wood.

Photographs on Enamel.—For the best portrait obtained photographically and burnt in in enamel.

Photographs on China.—For the production of a dessert or other service, in China or earthenware, ornamented by means of photography, and burnt in from an impression obtained either directly from the negative, or from a transfer from a metal plate obtained directly from the photograph.

Photographs on Glass.—For a table service in glass ornamented by means of photography, under similar conditions to the above.

Photographs on Windows.—For the production commercially of ornamental glass for windows by means of vitrified photographs.

Fluoric Acid.—For a substitute for fluoric acid to be used for engraving on glass, which shall be free from noxious fumes.

Reproducing Designs for Printing.—For a rapid means of reproducing artistic designs or sketches, for surface printing by machinery, such process to provide for lowering portions of the work to fit it for steam printing.

Rollers for Calico Printing.—For any important improvements for facilitating the production and economising the cost of engraving rollers for printing calicoes and other fabrics.

Doctors for Calico Printing.—For the best material for, and form of "doctors" for calico printing machines, which shall obviate the several objections to those now in use.

Aniline Colors.—For a means of fixing upon cotton and other fabrics all the ordinary aniline colors, so that the dyed fabric will effectually resist the action of soap and water, or cold dilute alkalies.

Naphthaline.—For a process for converting the naphthaline of gas works into alizarine or madder-red.

Turkey Red.—For an essay, with the results of experiments, on the manufacture of Adrianople red.

New Scarlet Dye.—For the production of a scarlet dye for cotton.

Murexide Red.—For rendering murexide red more permanent, when exposed to the atmosphere and sulphurous vapors.

Bleaching Wool.—For an account of any important improvements in the bleaching of wool.

Lakes for Carriages.—For the production of cheap purple and yellow lakes, of good quality, suitable for carriage builders, &c., and not liable to fade or change color.

Mordants.—For a treatise on the mordants employed in the dyeing of cotton, wool and silk.

New Green Dye.—For an account of the "green dye from Malda," as shown in the Indian department at the International Exhibition of 1862, including original researches, giving methods of fixing the same upon cotton and other fibers and yarns.

Green without Arsenic.—For the manufacture of a brilliant green color, not containing arsenic, copper, or other poisonous materials.

Chlorophyll.—For the manufacture of chlorophyll from grasses, suitable for dyeing silk and other fabrics of a green color.

Green Dyes.—For the manufacture of green dyes from coal or wood tar.

Ultramarine.—For an artificial ultramarine, not liable to alteration when thickened with albumen and fixed by steam.

Colors for Dyeing, &c.—For the discovery of oxy-naphthalic acid, a preparation of chloroxy-naphthalic acid, or for a treatise on the application of Laurent's colors to dyeing and calico printing.

Trade in Foreign Dye Stuffs.—For an essay on the influence of the Aniline series of colors upon the trade and commerce in foreign dye stuffs.

Thickening Colors.—For the introduction of any substance the use of which will essentially economise the cost of thickening the colors and sizes used in dyeing and dressing fabrics.

Substitute for Egg Albumen.—For a thoroughly decolorised blood albumen, or any economic and efficient substitute for egg albumen for calico printing.

Use for Yolk of Eggs.—For a new, large and economic use for the yolks of eggs, with particulars of the mode of preparation and preservation.

Uses of Seaweed.—For the extraction from seaweed of any substance or preparation capable of extensive application as a dye, drug, thickening, tanning agent, or any other generally useful product.

Clays.—For an account of the mode of occurrence, and of the uses of Cornish, Devonshire and Dorsetshire clays, and the quantities annually worked.

Artificial Stone and Terra Cotta.—For an account of the various artificial stones and Terra Cottas introduced and employed for purposes of construction, stating their properties, advantages and imperfections, and their relative cost.

Lighting and Ventilating Mines.—For an account of the methods at present in use, in the various coal-mining districts, for ventilating and lighting the mines, with suggestions for their improvement.

Copper Smelting, &c.—For an account of the various commercial copper ores, of the smelting processes, and the methods by which the precious metals can be separated from copper.

Tin.—For an account of the treatment of tin and its application in the Arts and Manufactures, and of recent discoveries of new sources of supply.

Wolfram.—For an account of the modes by which wolfram can be separated from other ores; and of the uses of Tungsten in the Arts.

Menaccanite.—For an account of Menaccanite or Iserine, and suggestions for obtaining Titanium from these ores.

Titanium.—For the best essay upon titanium, with suggestions for extracting and utilising the metal.

Smelting Zinc.—For an account of the processes now in use for smelting zinc ores, with suggestions for their improvement.

Sulphur and Arsenic.—For the best account of the production of sulphur and arsenic from the metalliferous ores of the United Kingdom, with statistics of the use and export of these substances.

Mining Machinery.—For improvements in the machinery for dressing poor ores of tin, lead, &c.

Regenerative Furnaces.—For the best account of the structure and application of regenerative furnaces to manufacturing purposes.

Locomotives for Tunnels.—For the best locomotive engine for working in tunnels and underground railways, so as to avoid the injurious effect of ordinary engines.

Ropes for Mines.—For an account of the comparative value of chains, hemp and wire ropes for drawing ores from mines, giving the practical result of experiments.

Pumping Engines.—For an account of the relative merits of the different kinds of engines used for drawing water from mines.

Plumbago.—For the discovery of graphite in Australia, of a quality and in quantity calculated to be commercially useful.

Aluminium.—For any new or improved process for the manufacture of aluminium which, by cheapening its cost, may render it applicable to many purposes for which it cannot now be employed.

Silicium.—For the best essay upon silicium, and its uses.

Melting Cast Steel.—For an easy and cheap method of melting cast steel in large masses.

Agricultural Steam-Engine.—For the production of an efficient agricultural steam-engine, capable of use on the farm, and of being made available as a traction engine, either on tramways or common roads, for carrying farm produce and manure to railway stations.

Brewery Plant.—For a descriptive account of improved designs for the construction and plant of breweries, especially in the arrangements for boiling, cooling, hoisting, pumping, washing, attemperating, cask-washing, &c.

Hydraulic Engine.—For a small, simple, cheap and effective hydraulic engine, which, in connection with the ordinary water service of towns could be applied to lifts in warehouses, driving lathes, blowing the bellows of organs, and many other purposes where steam cannot be made available.

Lighting Railway Carriages.—For a system of lighting railway carriages with gas, each carriage to have an independent supply equal to the duration of the oil lamps now carried, and the system to be adaptable to existing carriages.

Railways.—For a complete and economic system of constructing railways in iron, with the necessary plant for working railways in tropical countries and the colonies.

Protecting Iron.—For the invention of an efficient method of protecting iron from the action of air and water, applicable to the various forms in which iron is used as a building material generally, and also to iron ships and armor-plated vessels.

Unsinkable Ships.—For plans or suggestions for the construction of an efficient and seaworthy vessel, of such materials and specific gravity, that when perforated either by shot or accident, she shall still maintain her floating power.

Iron Ships.—For the best and most convenient method of welding together the frame-work and covering of iron vessels, so as to dispense with bolting and riveting.

Diving Apparatus.—For an improved diving apparatus in which divers may work free from the influence of great pressure, and at greater depths than by means of the diving-bell, helmet, or other existing appliances.

Shoal Recorder.—For an instrument to indicate the depth of water under a ship's bottom to prevent danger when at sea or nearing land.

Smokeless Fuel.—For the discovery or manufacture of a new smokeless fuel, which shall not occupy more space, or be of greater weight than the fuel now in use; and shall be equal in amount of heating power, without liability to injure metals in contact with it.

Motive Power.—For the generation of motive power in sea-going vessels by any process whereby the necessity of carrying a large supply of coal may be avoided.

Electricity.—For any new process for producing or obtaining galvanic electricity, so that it may be obtained in large quantities at small cost.

Application of Electricity to Organs.—For the production of an organ in which, by the use of electricity or magnetism, tunes of greater length and variety than those ordinarily produced on barrel-organs may be performed mechanically.

Silk Bobbin.—For a bobbin for silk, which shall possess exact uniformity of weight, be incapable of being

made heavier without detection, and which will not absorb moisture. The material employed must not be liable to chip, or to affect the color of the silk wound on it.

Lace Machinery.—For a mechanical substitute for hand-labor in running in the outline to figures in machine-wrought lace.

Woven Garments.—For the production in the loom, and introduction into commerce, of woven garments, suited for soldiers, sailors, emigrants, operatives and others, so as to economise the cost of production, and reduce the amount of hand labor.

Incombustible Paper.—For the production of an incombustible paper, so as to render the ledgers of commercial men, bankers, &c., indestructible by fire.

Dressing and Dyeing Skins.—For an account of the materials and methods at present employed in preparing and dressing skins, and the colors and treatments to which they are submitted in dyeing.

Dyeing and Dressing Leather.—For improvements in the method of dyeing or dressing Morocco or calf leather, in such manner as to prevent the surface from cracking in working, and to render it more fit to receive the gilding required in ornamenting books, furniture and other articles.

Leather Cloth.—For improvements in the manufacture of leather-cloth, or artificial leather, especially in imparting strength and durability, so as to fit it for the purposes of saddlers, harness-makers, trunk-makers, shoemakers, book-binders and others.

Substitute for Wool.—For any fibrous material available in large quantity and at a low price, capable of being used advantageously in textile fabrics, as a substitute for wool. The fiber should be from 1 to 6 or 8 inches in length, and suitable of being spun on the ordinary woolen or worsted machinery.

Substitute for Cotton or Flax.—For any new fibrous plant or substance which may be used wholly or in part as a substitute for cotton, flax, hemp, &c., or any new processes whereby useful fibers may be extracted from plants.

New Gums.—For any new substance or compound which may be employed as a substitute for india-rubber or gutta-percha in the arts and manufactures.

New Gums or Oils.—For any new gums or oils the produce of Africa, calculated to be useful in the arts and manufactures, and obtainable in quantity. Samples of not less than 25lbs. of gum, and 50lbs. of oil, to be transmitted to the Society.

Elastic Tubing.—For an elastic material for tubing, suited to the conveyance of gas, and not liable to be affected by alterations in temperature, or to be acted upon by the gas itself.

Glass.—For the production of glass by the use of the constituents of which the French sands are composed, such glass to be of a quality equal to that produced from those sands.

Color for Japanned Surfaces.—For the preparation of any color, applicable to the Japanned surfaces of *papier mache*, that shall be free from the brightness (or glare) of the varnished colors now used, but possess the same degree of hardness and durability.

Color for Slate.—For the preparation of light colors to be used in enameling or Japanning slate, which will stand the action of the heat from the fire without blistering or discoloration, and be sufficiently hard to resist scratches.

Electric Weaving.—To the manufacturer who practically applies electricity to the production commercially of figured fabrics in the loom.

Japanning Zinc.—For a process whereby the surface of articles manufactured in zinc may be economically japanned.

Coating Walls.—For the production of a cheap white enamel-like composition for the interior walls, &c., of houses, applicable to all ordinary surfaces, easily cleansed, not liable to crumble or chip, and capable of being tinted.

Substitute for Turpentine.—For a new and efficient substitute for turpentine, applicable to the manufacture of varnishes and to purposes for which turpentine is now ordinarily applied.

Substitute for Pitch.—For a cheap substitute for pitch, tar, &c., equally impervious to air and moisture, but non-inflammable.

Paper Machinery.—For a portable machine for planing the bars of a rag-engine roll true when the roll is in position. [Here is a good idea for some ingenious mechanic.—Eds. Sci. Am.] Also, for a cheap substitute for the expensive copper rolls now used in paper machines; a firm surface, not easily damaged by indentation, and not liable to oxidation, is essential.

Paper Material.—For the best essay upon paper-making materials, with suggestions for reducing economically the more refractory ligneous substances suited for paper-making, to a fibrous pulp, by mechanical or chemical means.

Rollers for Printing Paper-Hangings.—For a composition for feeding rollers for printing paper-hangings by cylinder machinery, similar in consistency and texture to the gelatine rollers used in letter-press printing, but adapted for working in water colors.

Paper-Hangings Colored in the Pulp.—For the manufacture of papers from colored pulp, bearing upon them designs, either colored or white, discharged after the manner of calico printing.

Lubricants.—For an account of the sources of supply, processes of manufacture, and relative value of the various lubricants employed in working machinery and rolling stock.

Red Oil.—For the solidification of oil by nitrous compounds, without the formation of red oil, or for the removal of the red oily body without injury to, or softening the solidified fat.

Improved Chemical Balance.—For the best chemical and assay balance, suitable for the use of students and experimentalists, which will, (with 600 grains in each pan) show a difference of ·005 or less. To be sold at a moderate price.

Cheap Spectroscope.—For the best and cheapest form of spectroscope.

Dialysing Apparatus.—For the best and cheapest form of dialysing apparatus, capable of being packed in a small compass, but of sufficient size to aid the country practitioner in the detection of poisons and adulterations, and in the preparation and purification of salts and drugs.

Incombustible Wick.—For the production of an incombustible wick, suitable for oil, spirit and other lamps.

Cyanogen Compounds.—For the economical production of cyanogen compounds for employment in the arts, or as manures.

Naphthaline.—For the discovery of a practical means of utilising naphthaline.

Oxygen Gas.—For a more economical process of obtaining oxygen gas than any in present use.

New Edible Roots.—For the discovery and introduction into this country of any new edible root, useful as food for man or cattle, and capable of extensive and improved cultivation.

Edible Seaweeds.—For a means of rendering seaweeds generally available as a wholesome vegetable food on board ship.

Improved Sugar Machinery.—For a practical report on any recent improvements in sugar machinery introduced into and adopted in the British or French colonies, or on the Continent.

Emigrants' Dwellings.—For the best essay (for the information of emigrants proceeding to new settlements,) descriptive of the means of treating existing natural products in any locality, such as earths, shells, chalks and limestones, woods, barks, grasses, &c., and applying them in the construction of dwellings. Diagrams and illustrations of the methods of applying materials should be given.

Colored Starches.—For the production of a series of colored starches, which can be applied to articles of dress, such as lace, &c., without injuring or staining the fabric, but at the same time give to them the required tints, and thus render them in harmony with other portions of dress.

Tobacco.—For an account of the cultivation, preparation and manufacture of the various kinds of tobacco and the commerce therein.

Refractive Power of the Eye.

By the refractive power of the eye, objects situated a little behind us are seen as if they were on a straight line from left to right. Pictures of external objects which are represented on the retina, are included in an angle much larger than one-half of the sphere at the center of which the observer is placed; from this point of view a single glance encompasses a vast and splendid panorama, extending to an angle of 200°. This is the result of the common law of refraction. All the rays of light passing through the cornea to the crystalline lens are more and more refracted in proportion to the angle at which they strike the spherica surface of the cornea. Consequently, the only objects which are seen in their true position are those entering the eye in the direction of the optic axis. By this refraction the rays which enter the eye at an angle of 90° are bent at 10°, and appear to come from an angle of 80°. This phenomenon produces a very curious illusion. When we are lighted by the sun, the moon, or any other light, if we endeavor to place ourselves in a line with the light and the shadow of our body, we are surprised to find that the light and the shadow seem not to be connected at all, and that, instead of being in a line, they appear bent to an angle of 160° instead of 180°, so that we see both the light and the shadow a little before us, where they are not expected to be. The eye refracts the line formed by the ray of light and the shadow, and the effect is like that of the stick, one-half of which being immersed in water, appears crooked or bent into an angle at the point of immersion. This enlargement of the field of vision to an angle of 200°, is one of those innumerable and wonderful resources of Nature by which the beauty of the effect is increased. Our attention is called to the various parts of the panorama which appear in any way a desirable point of observation, and we are warned of any danger from objects coming to us in the most oblique direction. These advantages are particularly felt in our crowded towns, where we are obliged to be constantly on the look-out for all that is passing around us.

Food and Breathing of Plants, Animals and Engines.

Carbonic acid, water and ammonia are the food of plants—simple forms of matter, which they take and mold into the complex organic forms of which the substance of plants consists. Animals feed upon these plants. Animals have not the power of producing complex organic matter, such as the simple inorganic forms of water, carbonic acid and ammonia. They receive their nutriment from plants, and the whole act of their lives is to take those highly organised forms produced by plants, and convert them again into the simple conditions of carbonic acid, water and ammonia, from which the plants derive their food. Look what a machine an animal is: how closely he resembles a steam-engine! A steam-engine in action takes fuel, which is its food, consisting of coal and wood, which are decayed vegetable combustible matter. A steam-engine takes in water, and so does an animal. A steam-engine breathes air, and so does an animal. A steam-engine produces, by the combustion of the air upon the fuel, a steady boiling heat of 12° by quick combustion; and the animal produces a steady animal heat of 98° by slow combustion. The steam-engine produces smoke from the chimney—that is, air loaded with carbonic acid and vapor. An animal produces foul breath from the windpipe, which is air loaded with carbonic acid and vapor. The steam-engine produces also ashes, which is part of the fuel which does not burn; and the animal produces refuse, which is a part of the food passing from the body unconsumed. The engine produces motive force or alternate push and pull in the piston, which acting through levers, joints, and bands, does varied work. The animal gives rise to motive force by alternate relaxation and contraction of the muscles, which, acting through levers, joints and tendons, does varied work; that is to say, an animal is, in all its chemical functions, a machine which is producing certain results by combustion; and it takes these complex vegetable and animal combustible substances and gives them out in a simpler form.

The Soda Trade.—M. Thibierge states that the soda trade, which had its origin in France, is now visibly falling off in the supply of raw material, which may now be found in greater abundance in foreign parts. To remedy this evil, M. Thibierge proposes to mix sulphuret of iron, or of iron and copper, which exists in vast quantities, with any combustible,—such as peat, lignite, coal or coal-dust, and then set fire to it. The result of the combustion would be ashes, containing metallic oxides and sulphate of soda, which might be easily separated and transformed into carbonate.

A new steam whistle, six feet high (?) and fifteen inches in diameter, has been erected at Colt's factory, Hartford, Conn. It can be heard all over the city.

Amaurosis from the Use of Tobacco.

The following extracts are from the *Lancet* (London) and the *British and Foreign Medical and Chirurgical Review:*

"Dr. Mackenzie, in his great work on Opthalmology, expresses his belief that tobacco is a *frequent* cause of amaurosis, and adds, that 'one of the best proofs of tobacco being the cause of amaurosis is in the great improvement in vision—sometimes complete restoration—which ensues on giving up the use of this poison,' and cites a very striking case in illustration.

M. Sichel observes, that among cerebral amaurosis there are two forms but little known. One of these, observed in drinkers, he himself described as symptomatic of delirium tremens several years ago. The other, due to the use of tobacco and first indicated by Mackenzie, he once doubted the existence of. Subsequent experience has, however, convinced him of its reality; so much so, that he is now of opinion that there are few persons who have smoked during a long period more than five drachms of tobacco per diem without having their vision and frequently their memory enfeebled. Both these forms of amaurosis are characterized by the absence of well-marked symptoms of cerebral congestion, the symptoms vibrating between those of sthenic and asthenic amaurosis, and the surgeon remaining in uncertainty as to their seat and nature until the special cause is discovered. In treating them, discontinuance or diminution of the habit is a great and a difficult desideratum. Depletion, even local, should be employed with the greatest caution; and stimulating liniments or flying blisters may aggravate the symptoms. A purgative, consisting of equal parts of magnesia and cream of tartar, is an excellent means when the function of the stomach is active, alternating it with pills of gum ammoniac and aloes; but in the disordered stomach of drinkers, small doses of rhubarb and magnesia, given twice a day, one hour before meals, form a good corrective. Bathing the eyes and forehead with cold water and dry cupping or flying sinapisms applied to the extremities, are excellent adjuvants. M. Mercier, in corroboration of the unsuspected effects of tobacco in generating disease, related a case in which a cough, which had persisted for a year, and purpura, which had lasted for seven months, soon yielded after the cessation of smoking, which had been excessive."

Breathing Apparatus.

At a late meeting of the Academy of Sciences, M. Galibert described an apparatus for securing free and complete breathing to persons obliged to stay some time under water, or to penetrate into places filled with deleterious gases or smoke. This apparatus consists of a piece of wood, having the form and dimensions of the human mouth when open. To this piece of wood two India-rubber tubes are fixed, of any length, according to the exigencies of the case. The man engaged in the operation is further provided with a nose-pincher, or instrument for compressing the nostrils, so as to prevent the introduction of deleterious gas or of water, as the case may be. The operator puts the piece of wood into his mouth, and puts on the nose-pinchers; he stops one of the orifices with his tongue and inhales pure air from the other; after which he shifts his tongue to the latter orifice, and exhales his breath through the other. He continues thus regularly shifting his tongue from one orifice to the other, in the order of the inspirations and expirations; but even a mistake would be of little consequence. A man easily learns the use of the apparatus by a few minutes' exercise. This contrivance has the merit of requiring no preparation, thus affording a speedy means of giving assistance in the case of fires or of suffocation by water or gases. It might also be used in medicine for the complete immersion of patients in a bath, which might sometimes be advisable.

An Iron-Clad Man of the Past.

An exchange says:—"We examined, a few days ago, in the office of Attorney-General Galbrath, a very interesting historical relic, being a portion of the armor of one of the Spanish Knights who first invaded and explored the wilds of this Western continent. The armor was found in the neighborhood of Monticello, Jefferson county, in the State of New York. The portions preserved are the helmet, the vizor and gorget, and coverings for the arms. We understand that the rest of the armor was found, but has been inadvertantly lost or destroyed. This armor is of the most solid and substantial character, that for the head alone weighing fifteen or twenty pounds, and being impenetrable to musket or rifle balls. It is possible that the armor belonged to one of the expeditions of Pamphilo de Narvaez, which was lost in the country, or to one of the army of De Soto, and is about 350 years old—perhaps much older. The frame that could bear this iron incasement must have known the discipline of arms, and been strengthened in the battle and the breeze. The armor is of complete workmanship, strong rather than fine; and must have been as complete a covering for the human form as the armor of the ocean monsters that bid defiance to the rifle cannon shot of the present day. Probably, in future times, the iron-clads of our own day will be regarded as the curiosities of a past age, the utility of which will hardly be perceptible to our descendants."

How to Shoe Horses.

As many valuable animals are ruined by careless farriers, we give the following article, from the *Irish Country Gentleman's Journal*, in the hope that it will be the means of some reformation in this respect:—

"To shoe horses with ordinary feet we would suggest the following directions to the farrier:—With your drawing-knife take off from the ground surface of the crust as much as may represent a month's growth. Remember that there is generally a far more rapid growth of horn at the toe than at either the heels or the quarters. More, therefore, will require to be taken off the toe than off other parts; in other words, shorten the toe. Be careful to make the heels level. Having lowered the crust to the necessary extent with the knife, smooth it down level with the rasp. Round off the lower edge of the crust with the rasp. Do this carefully and thoroughly. If a sharp edge be left, the crust will be apt to split and chip. The preparation of the foot is now complete. It remains to fit the shoe to the foot. Let the shoe be made with a narrow web (¾-inch), or even width all round, except at the heels (direction No. 8), flat toward the sole, and concave to the ground. Turn up the toe of the shoe on the horn of the anvil. The degree of "turn-up" must be regulated by what you find necessary in each horse to make the wear nearly even all over the shoe. It will be found in practice that most horses take much about the same degree of "turn up." Make five counter-sunk nail holes in each shoe, viz.: three on the outside, and two on the inside. Make the anterior hole on each side immediately posterior to the "turn up." Let the second and third holes on the outside divide evenly the remaining space on the heel. Let the second hole on the inside be opposite to the second hole on the outside. Let the nail holes be punched coarse, *i.e.*, nearly in the center of the web, brought out straight through to the other side. This may be done with safety where a good crust has been preserved. Fit the shoe accurately to the foot. It must be as large as the full unrasped crust, but no part must project beyond. The shoe must be continued completely round toward the heels, as far as the crust extends. The web must be narrowed at the heels, so that its inside edge may cover the line of the bars and no more. Slope off the heels of the shoe in the same direction as the heels of the crust, so as to prevent the possibility of their catching in the hind shoe. Select nails that will fit exactly into and completely fill the nail holes. Twist off the clenches as short and stubby as possible, and lay them down flat with the hammer, and let the pincers during this time be firmly pressed against the heads of the nails. The clenches are not to be filed either before or after turning down, nor is a ledge to be made in the crust to receive the clenches. For ordinary hind feet the pattern of shoe in common use is recommended, but with a clip on each side, immediately anterior to the first nail, instead of one only at the toe. This double clip keeps the shoe steadier in its place than the single. The web should be made somewhat wider at the toe than at other parts, in order to allow space for the thorough sloping of its inner edge. For reasons which have been already explained, the hind foot does not require to be shortened at the toe like the forefoot; but the other directions given above—namely, as regards lowering the crust, rounding its lower edge, accurate fitting without rasping, punching the nail holes coarse, nailing and clinching with the total absence of rasping, paring, opening the heels, cutting away the frog or bars, &c.—apply equally to hind as to fore feet. Six nails—viz., three on each side—are needed for the hind shoe. Without the third nail on the inside, shoes are apt to "twist" on the feet. The horse is now shod. Nothing more must be done for the sake of what is called appearance. The best iron only should be used for shoes. Good iron makes a light shoe wear as long as a heavier one of inferior metal.

Exemption from Draft.

We have heard of a great many dishonorable and mean make-shifts resorted to by individuals to avoid drafts. We don't blame them; some kinds of drafts are excessively disagreeable—we don't mean Uncle Sam's at this time—but the "windy" affair that searches every pore in the body in the hope of finding some entrance to the vital parts of the frame. On another page our readers will find an engraving of a patent weather-strip, which we will warrant to procure them an exemption from the most dangerous of all drafts, at a tithe of the cost charged by unscrupulous men for obtaining exemption from military duty. We know whereof we speak in recommending this invention, for we have this weather strip in use in our own dwelling, and we are satisfied that at the present high prices of fuel it will save enough in a single winter to pay the whole expense of its application, while it renders the house much more comfortable, and, at the same time, excludes all street dust, which is so annoying to housekeepers in windy weather. The illustration and description on another page explains the construction of the strip, from which it will be seen that it is both cheap and durable. The enterprising inventor, Mr. Brown, informed us a few days ago that he had nearly fifty men employed in this city alone, putting the weatherstrip upon dwellings, stores, banks and public buildings. This is another instance of the value of the "little things" in every-day use; when once patented they become the source of an immense business.

Night and Day Traveling.

Many people are averse to traveling on railways by night, having the impression that there is greater liability to accident. Statistics tend to show the reverse to be true. A writer in the *Railroad Advocate* sums up the case for night trains pretty strongly. "At night all work on the track ceases, and there are but few trains running. Draw-bridges are generally all closed; switches are not so liable to be misplaced, as they are less used; the signals for trains are more certain, for lights are used and can be seen further. The engineer has nothing to divert his attention by night. Rocks and trees are no more liable to fall upon the track by night than by day; nor are cars more likely to break at one time than another. The passenger in a night car is more apt to keep his seat and remain quiet by night; and that is the safest thing he can do in a railway car."

An Unfounded Claim.

The *Mechanics' Magazine* of Dec. 4th, has a letter from a correspondent who asserts that the armor-plating of the *Puritan* and *Dictator* class of ships was invented in England by an individual called "Walker," and the editor adds, in a paragraph, that this person is entitled to all the credit of the same, he having patented it seventeen months ago. It is proper that we should inform the gentleman that the armor in question is the invention of Capt. Ericsson, and is the same that was applied to the original *Monitor:* an addition of two or three inches of iron, or substituting a solid plate for two single ones, does not amount to a change of plan. The ideas may be similar, but they were conceived on this side of the Atlantic before Mr. Walker was ever heard of in this connection.

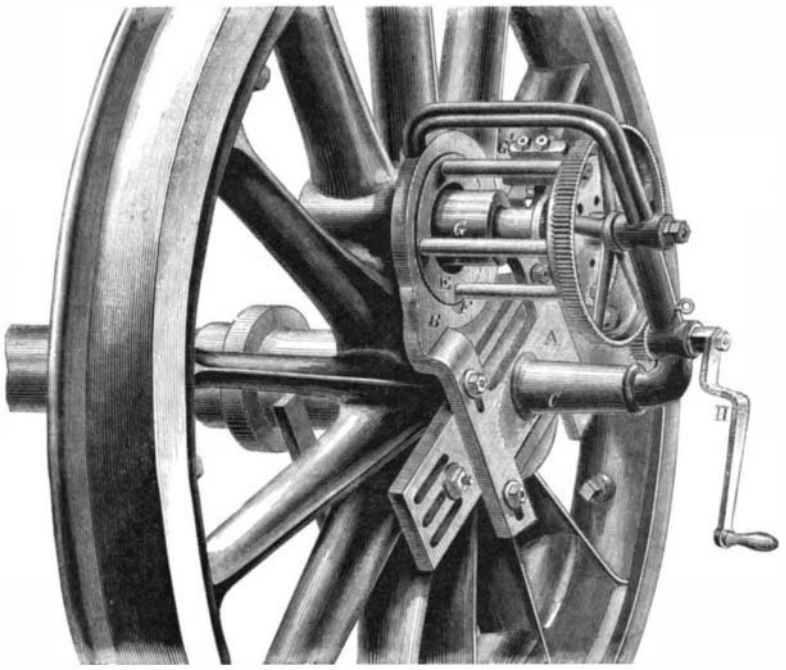
THE WATER OF THE DEAD SEA.—A French gentleman, M. Roux, publishes a paper on the composition of the waters of the Dead Sea,—showing that it contains about 9½ per cent. of the chloride of magnesia, 6 per cent. of chloride of sodium, 3 per cent. of chloride of calcium, 1½ per cent. of chloride of potassium, and traces of bromide of magnesium, sulphate of lime, hydro-chlorate of ammonia, carbonate of lime, oxide of iron, alumina, and 79½ per cent. of pure water.

Improved Lathe for Crank Pins.

When locomotives have been in use for such a length of time that new brasses are required to be put in the parallel rods, it is generally found that the crank pins are worn eccentric and out of truth, to such a degree that it is impracticable to fit new brasses to them, so that the wheels will "tram," or, in other words, so that the distance between the surface of the several pins shall remain the same in every part of the revolution of the wheels.

The practice heretofore has been to remove the wheels from the engine, pull out the old pins and substitute new ones, although the old ones were large enough, if true, to use still longer. This process proves expensive, from the fact that so much time is spent in the operation, as frequently new brasses are required when the engine does not need "jacking up" for other work. The object of the machine illustrated herewith is to turn the pins true with their original centers, making them as good as new, except the slight reduction in diameter. The machine is light, portable and capable of being applied to wheels either under the engine or detached from the same, and is to be worked by hand power. When horse-power is convenient, however, the crank maybe removed and a pulley substituted, thus expediting the work. One man can turn a set of pins in two days.

The construction of this portable lathe, for such we may call it, is as follows:—The cast-iron bed-plate, A, is fastened to the arms and body of the wheel by bolts and clamps, as shown. This bed-plate carries another casting, B, which has oblong holes in it for the purpose of vertical adjustment; this casting and the column, C, as well as the brace, B, are all in one piece, and serve as a support for the cutting apparatus. This latter consists of a circular head, E, fitted easily in a seat turned for it at F, and running upon a shaft at its opposite end, where a set screw is provided that takes the old center in the pin, G, to be turned. A small head-stock, G', is fitted to a cross-bar, not shown in the engraving, and the tool is screwed up in the stock, as usual; suitable means, not easily shown in the position of the machine, as taken, are provided for feeding the tool over the work. It will be seen that when the crank, H, is turned, the pinion drives the large spur wheel, which, being attached to the revolving head, E, carries the tool around the pin with a slow and steady motion; at the same time the tool is fed across by the lateral feed before mentioned; the operation is precisely similar to that of a lathe. This machine can, by means of its construction, be easily adjusted to cranks of any length of stroke, and shifted sideways or upward to suit circumstances. It has been suggested after years of attention to, and experience with, locomotive engines; it is extremely simple, and furnishes a very cheap and convenient method of fitting crank pins to receive new brasses. When it becomes necessary to renew a set of brasses, it will save from $40 to $50 on each engine.



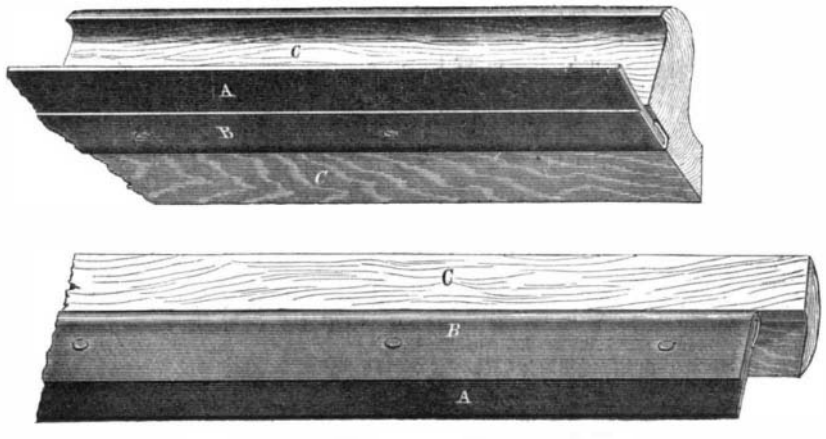
CHENEY'S LATHE FOR CRANK PINS.

This machine has been in successful operation for nearly a year on the Chicago, Burlington and Quincy Railroad, at Galesburgh, Ill., and was patented through the Scientific American Patent Agency, Aug. 11, 1863. For further information address the inventors, S. S. and D. Cheney, Box 1,028, Galesburgh, Ill.

Improved Metallic Weather Strip.

Very few people have any idea of the amount of fuel wasted in heating houses that are too thoroughly "ventilated" for comfort. In time the best constructed houses become uncomfortable in cold weather from the shrinkage of the doors and windows. Fresh air is highly desirable and very necessary to health, but people generally choose to regulate the admission of the same to suit their own tastes, and have no fancy for piercing drafts and arrowy rushes of cold air creeping up the back, or blowing never so gently down their necks. Insidious streams of air rushing through every unguarded crack or crevice, are so many agents of death, and in delicate constitutions very often sow the seeds of disease which ends fatally. To obviate such evils and to economise fuel, which is so expensive at this time, the weather strip herewith illustrated has been introduced. It is merely a strip of vulcanised india-rubber A, covered with a sheath of zinc, B; thus constructed, the strip is nailed to a molding prepared to receive it, in the manner fully shown by the engraving; these moldings are made of any shape, size or style, to suit the windows to which they are to be applied. The inventor says, in relation to this weather strip;

"In order to produce a perfect thing, the elastic substance in these improved strips is so secured to the metallic back as to expose both the edge and side of the yielding substance, and thus provides against all defects in the window or door to which it is applied, by presenting to the contact of its surfaces a substance possessing the capacity of self-adaptation



BROWN'S METALLIC WEATHER STRIP.

thereto. It is so constructed that the nails which hold the molding in place also pass through the weather strip, in addition to the special fastening applied to the strips themselves.

"The strips are applicable to the crevices of shrunken doors or windows of private and public buildings, railroad cars, steamboats, show cases, picture frames and various other purposes. Their application to cabin and pilot-house windows of steamboats, effectually stops the clattering noise occasioned by the vibration arising from the machinery. They produce the same effect on all doors and windows in stormy weather. They can be applied to every description of door and window. They are neat and ornamental in appearance, when covered with a neat molding of walnut, cherry, oak wood or white enameled. They are permanent and durable; being made of metal, they are not liable to shrink or warp, and are equally good in summer or winter, as they effectually exclude heat and dust as well as cold. The price places them within reach of all. There is no longer a necessity for double sashes, as the new strips entirely supersede their use, at one-tenth the cost, and are a saving of coal alone of fifty per cent. in the winter season. This invention was patented on February 18th, 1862. Local agents wanted in every State, city or town in the country. For further information, address Patent Metallic Weather Strip Co., No. 644 Broadway, corner Bleecker street, New York.

Chapped Hands.

The discomfort and annoyance of chapped hands is very great and might be avoided if people would take proper care in drying their hands after washing them. Cold cream is a very good remedy for this and other cutaneous irritations, and the following recipe will enable any one to prepare it where the article cannot be procured at the shops:—Melt together in a water bath (that is, a vessel immersed in boiling water, like a carpenter's glue-pot) eight ounces of fine neat's-foot oil or almond oil, three ounces of spermaceti, and one and a half ounces of white wax; when thoroughly melted pour the whole into a pan, which, in winter, must be kept very warm by the fire; then, with a clean flat stick, beat the mass continually until it is uniform in body; pour in half a pint of rose or orange-flower water, and one-fourth of an ounce of spirit of bergamot, or any other perfume desired; then beat rapidly again until the whole of the water and spirit is taken up by the unctuous portions. If made in winter all the materials must be warmed as mixed, or the mass will be lumpy. Lard or sweet oil may be substituted for the almond oil. If care is observed the mass will be as white as snow.

Extension of Patents---Special Notices.

Lyman Kinsley, of Cambridgeport, Mass., having petitioned for the extension of a patent for an improvement in cast-iron car wheels, granted him on March 12, 1850, it is ordered that said case be heard at the Patent Office, Washington, Monday, Feb. 22, 1864. All persons interested are notified to appear and show cause why said petition should not be granted.

Also, John C. Dodge, of Dodgeville, Mass., having petitioned for the extension of a patent granted him May 14, 1850, for preventing fibers from winding on drawing rollers in spinning machines, it is ordered that said claim be heard at the Patent Office, Washington, April 25, 1864. All interested are notified to appear and show cause why said petition should not be allowed.

Also, John T. Davy, of Lansingburgh, N. Y., having petitioned for the extension of a patent granted him on March 12, 1850, for a furnace for heating sad-irons, it is ordered that said claim be heard at the Patent Office, Washington, Feb. 22, 1864. All persons interested are notified to appear and show cause why said petition should not be granted.

Parties opposing the extension of claims must file their objections at the Patent Office, in writing, at least twenty days before the day of hearing.

THERE are now 40,000 negroes armed and in the service of the Government.

IT is calculated that the wool clip of Minnesota the present year will not be less than 500,000 lbs.