sumes 142 units of heat, the solar ray sexert a heating influence of $2\frac{1}{2} \times 142 = 355$ units of heat per hour on each square foot. But as 1 unit of heat is equivalent to 772 foot pounds, we have for the solar action a force of 274,040 foot pounds per square foot per hour, or 80 foot pounds per second. It has been demonstrated that light moves with a velocity of 192,000 miles, or very nearly 1,000,000,000 feet, per second; and calling the weight or mass of the molecules (which, according to the Newtonian theory, are emitted from the sun) $= x$, we must, to ascertain the mechanical momentum of the effect of this transmission, multiply the mass with the square of the velocity; and as this momentum is found equal to 80 foot pounds per square foot, we have the equation: $1{,}000{,}000{,}000^2 \times x = 80$, from which it follows that $x = 80 \div 1{,}000{,}000{,}000^2 = 0.0000000000000000008$ for the mass of a column of the interstellar medium 192,000 miles, or 1,000,000,000 feet, long and of 1 square foot section Dividing this value of x by 1,000,000,000, to find the weight of 1 cubic foot, we see that it will amount to 0·00000008 lb. As the weight of 1 cubic foot of hydrogen is, at the ordinary atmospheric pressure, 0·002 lb., we see that, if these calculations are worth any consideration, the weight of the interstellar medium is about a million times less than hydrogen; therefore it is utterly inappreciable by our most delicate balances, but still very appreciable by calculation and observation. If we accept the Huyghenian theory of light transmission by waves, the mechanical effect of the luminous waves, striking with the demonstrated velocity of light (notwithstanding that its calculation involves more complex and difficult questions), will give results not very different from the above estimates; and these make it highly probable that the specific gravity of this interstellar medium is not absolutely zero, but stands in about the same relation to rarefied hydrogen as rarefied hydrogen does to platinum.

FOREIGN PATENTS—SPLENDID OPPORTUNITIES FOR AMERICANS.

We would direct the attention of inventors to the large reductions which have been made in the expenses pertaining to the securing of patents in foreign countries, as fully set forth in the advertisement of Messrs. Munn & Co., published on another page. It is not realized as thoroughly as it should be that the world, and not any one political division of it, is the inventor's legitimate field; that an original and useful device is likely to be as valuable and as profitable in one civilized country as in another; and therefore for the possessor of the same to attempt to glean its full advantages, from its working only in the United States, is as shortsighted as would be the course of a wholesale merchant who should reject all trade except within the limits of the town or city in which he resides. Add to this that American inventions have acquired an enviable reputation abroad, and are eagerly sought after, and an opportunity is offered for making money infinitely superior to that presented in the territory from which a dealer in other men's wares must literally discover and extract the means of establishing a business.

But apart from all these considerations, it is certain that at no period since patents have been in existence has the acquirement of foreign protection for his device been more vitally important to the American inventor than at the present time and during the coming year. All the world knows that in a few months such a display of new and ingenious inventions as has never before been witnessed will be exhibited at Philadelphia. Every means of making this Exposition known has been adopted. The foreign newspapers are filled with preliminary accounts of the buildings, and with anticipations of the grandeur of their contents. Our home journals are constantly on the alert to give to the public the latest intelligence of the progress of the enterprise. Nearly all the great governments of the world are getting ready exhibits of the finest productions of their several countries, and, finally, thousands of people, including probably all most prominently interested in invention and in industrial progress, will personally make the journey to the Centennial. The machine builders of England and France, the iron producers of all the European countries, capitalists from abroad ready to invest in and promote the advancement of new and useful ideas, all will scrutinize with the utmost interest our national display, and seek to profit by it. Skilled foreign engineers will examine every detail of the mechanism, ingenious foreign inventors will contrast their devices with ours, and note the improvements, and, in brief, we may venture safely to say, of each and every American invention of merit in the Exposition, there will be many scores of people who will have its every feature impressed on their memories, if not accurately portrayed in their note books. What then is to prevent these people from returning to their own countries and, with all the data before them, reproducing every American device, and reaping a rich harvest in return? Nothing but the protection of the foreign patent, of which the American inventor may now avail himself; and if that patent is not secured, he must be content to stand aside and see his ideas appropriated.

The advantage of the foreign patent does not, by any means, end with the prevention of piracy at the Centennial, important as such effect may be. It renders every particle of the enormous amount of advertising done for the Centennial as valuable to the inventor as if it had been done for his individual benefit. It changes every foreign visitor, coming from the country where he has protection, from a possible pirate into a probable customer. It brings him a new clientage, limited only by the population of the nation; and if his patents are obtained in four great countries—England, Canada, France, and Belgium—a hundred million people are tributary to his monopoly. His interest will then be to display the new and original advantages of his productions, not to keep them back; to distribute descriptions and drawings broadcast, instead of nervously watching every stranger who dallies with pencil and notebook; to court inquiry relating to his invention, rather than to avoid the same.

We think that there are few American inventors who will not appreciate the importance of this matter. It is a simple duty, easily attended to, and, as will be seen from Messrs. Munn & Co.'s announcement, the facilities of the largest patent agency in the world are now placed at every inventor's disposal, at an expense less than ever before, and certainly inconsiderable in view of the advantages to be gained.

"WRINKLES AND RECIPES."

We have never actually counted the number of questions which the SCIENTIFIC AMERICAN is called upon to answer through its "Notes and Queries" column; but it is no exaggeration to estimate these at several hundreds weekly. It is of course impossible for the editors to reply to all in full: first on account of the space at their disposal not being unlimited, and second because large numbers of the queries have been previously answered in its columns. Many readers, however, from various causes, either do not possess or have not access to the back files of the SCIENTIFIC AMERICAN; and it is to benefit these, as well as to place in the hands of mechanics generally a plain, precise, and practical handbook, in which the queries which form the very large majority of those constantly received at this office will be found fully and completely answered, that *Wrinkles and Recipes* has been projected.

The volume is divided into five departments, namely, Mechanics, Engineering, Practical Technology, the Farm, and the Household; and while embracing under these general headings a large amount of the most valuable and practical information which has appeared in the SCIENTIFIC AMERICAN, rewritten and condensed with care, it also contains a goodly proportion of entirely new material, prepared expressly for its pages. For example, under the division of Mechanics, will be found fine engravings of a set of master tools, forged at the request of the editor by Mr. Joshua Rose, and experimented upon by him until their form was such as to give the fullest possible duty. The perfected tools were placed before the artist and reproduced with the closest accuracy in point of size, etc., so that, with the complete instructions given in the letter press, any mechanic can make them for himself. These tools are adapted for metal turning, boring, etc. In the same department is also the cream of the series of papers on Practical Mechanism, which during the last two years have appeared in the SCIENTIFIC AMERICAN, also selected and rewritten by their author, Mr. Rose. In the Engineering department is a new paper on testing metals, expressly written by Professor Thurston, and also a series of illustrated articles, with practical rules on steam engineering topics, prepared by Mr. R. H. Buel. It is believed that the brief treatises on the slide valve, the indicator, on testing engines, and on the governor, are the simplest as well as the most practical expositions of these subjects extant. The department of Practical Technology, compiled under the supervision of Professor P. H. Vander Weyde, embraces recipes of all descriptions, for metal working, for cements, alloys, and glues, for electrical batteries, and on hundreds of other practical subjects. Under the head of the Farm are given suggestions of all kinds useful to farmers; and in the following department of the Household, the housekeeper is provided with an invaluable repertory of useful hints. Especial attention has been devoted to "trade wrinkles and secrets" of which a large number are presented in the Mechanical department.

Altogether the work is one of the most useful guides for the classes to which it is addressed that has come under our notice; and it is sold at a price ($1.50) which places it within almost everybody's reach. It comprises 250 pages, neatly bound in flexible grease proof covers for the pocket. Copies may be obtained, post paid, by mailing the price to H. N. Munn, publisher, P. O. Box 772, New York city. See advertisement on back page

VENEERED DIAMONDS AGAIN.

Sydney Smith once observed that it required a surgical operation to get a joke into a Scotchman's head. We do not know whether the anonymous individual who has just sent us a letter signed "A Friend" hails from the land o' cakes; but we fear such must be the case, in view of the merciless hauling over the coals which he inflicts upon us for our recent innocent remarks on a cheap jewelry swindle. We might endure the letter in silence and lock the suffering it causes in our lacerated breasts, but now the veneered diamond man himself twists our paragraph into a commendatory testimonial, and publishes it as such in his brazen advertisements.

Seriously, however, for the sake possibly of others who may also have misunderstood our meaning, and in order to furnish the diamond(!) merchant with a new paragraph for future advertisements, we may plainly state that the wonderful discovery is a miserable deception. Science has never been able to produce the diamond artificially, though countless attempts have been made. Professor Silliman, by the aid of an intense heat, has made little globules from plumbago, which were transparent, and which resembled the genuine stone; so also globules have been obtained from apparently fused charcoal, but close examination showed them to contain iron and carbon, which proved that the charcoal had never been perfectly fused. Dr. Hare, of Philadelphia, by means of a deflagrator, succeeded in obtaining a metallic luster from intensely heated charcoal. Cagniard de Latour pretended to have discovered the ingredients of the gem; but the small crystals shown by him turned out to be peculiar silicates, which polarized light differently from the diamond. M. Despretz has conducted experiments which are probably the furthest advanced of any. By voltaic action he prepared a pure carbon from sugar candy, which was deposited in the shape of microscopic crystals in black octohedrons, or colorless translucent plates, the whole of which had the hardness of the powder of the diamond, and which disappeared on combustion without leaving any perceptible residue. Being, however, only in powder, it was impossible to isolate and weigh these crystals, or to determine their index of refraction or angles of polarization, the two tests which infallibly distinguish the true diamond. It is reported, also, but we know of no confirmatory evidence, that a mixture of chloride of carbon and alcohol, when acted upon by galvanic currents for six months, is decomposed with a result similar to the above.

As regards the ridiculous theory of the humbug we have referred to, certainly no refutation of it is necessary. We have a better opinion of the scientific knowledge of the readers of the SCIENTIFIC AMERICAN, and of our journal itself as an educator, than to credit the idea that others, beside those few intensely matter of fact persons who have written, wondering that we could be so humbugged, will be deceived by so palpable a fraud.

SCIENTIFIC AND PRACTICAL INFORMATION.

ILLUMINATING GAS FROM CORK.

To the list of substances capable of furnishing illuminating gas of good quality, cork is now to be added. Recent experiments, made in Bordeaux, France, have given results both economical and satisfactory, and it has been definitely decided to use the material in the lighting of the city. Works for burning cork are now in process of construction. The fragments of cork, principally waste left after cutting bottle stoppers, are distilled in a close retort. The flame obtained is stated to be whiter and more brilliant than that of coal gas, while the blue zone is much smaller, and the density considerably greater.

A SOLAR ENGINE.

M. Mouchot has recently exhibited to the French Academy of Sciences a simple form of solar engine. It consists of a cone of polished tin, reversed and arranged so that its interior can be adjusted toward the sun. In the axis of the vessel is suspended a large flask of white glass, inside of which is a metal boiler covered with lampblack. The rays, concentrated by the mirror-like surface of the cone, traverse the glass easily, and are accumulated on the boiler, in which they speedily produce an ebullition of the water, and steam sufficient to drive a miniature engine. By increasing the dimensions of the apparatus, M. Mouchot has obtained a utilizable force, and produced, after three quarters of an hour exposure to the sun, a boiler pressure of 60 lbs. of steam.

NATURAL GAS FURNACES.

The constantly increasing utilization of natural gas for industrial purposes, throughout the oil region of Pennsylvania and its neighborhood, is attracting much favorable comment. The success of the puddling and heating furnaces at Erie, Leechburgh, and elsewhere in Pennsylvania, where the experiment has been thoroughly tried, seems to have attracted a widespread interest to the subject, and we now learn of schemes on foot to utilize the gas upon the large scale. Near Beaver Falls, the gas issuing from a well 1,100 feet deep is employed in a file factory at that place. It is also reported that the product of the great gas well in Butler county, Pa., will be brought to certain iron works in Pittsburgh. The work of laying a pipe, six inches in diameter and seventeen miles long, is said to be contracted for, to be finished within a month. It is further reported that a project is being mooted to purchase all the gas wells in Butler county, and bring their product to the Pittsburgh manufactories. This last scheme, if successfully realized, would work quite an industrial revolution. But, whether feasible or not, the agitation of the subject is an indication that the question, of utilizing the enormous volumes of valuable heating gas which have, until the present, been allowed to go to waste, is at length receiving the attention it deserves.—*American Exchange and Review.*

AN AUTOMATIC SWIMMING APPARATUS.

Under the auspices of the London Swimming Club, and at the City of London Swimming Baths, Golden lane, London, an invention for facilitating the acquisition of the art of swimming was recently exhibited. The invention, which was practically tested in the case of persons who could not swim, first consist in stretching across the bath, in any direction, a wire somewhat similar to a single telegraph wire, placed at some hight above the water and parallel to it. Upon this wire a grooved pulley is mounted, from the axis of which an elastic cord depends, terminating in an adjustable supporting belt for the body to rest on. The weight of the body when in the water is capable of receiving more or less support according to the degree of proficiency the learner has attained. The suspended weight from the axis of the pulley, being under the line of support, keep the pulley in a true vertical position, so that during the time the swimmer is striking out the supporting pulley travels along the wire at a rate proportionate to the speed of the swimmer. To suspend the body in water by a string is not a new idea; but this contrivance is self-acting. The members of the club, who are laudably offering to teach swimming gratuitously to all who lack the art, consider this invention the best that has yet appeared for helping the novice to attain proficiency in swimming.