[For the Scientific American.]

A LIGHT UNIT.

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The measurement of the intensity of artificial light is one of the problems that has not been satisfactorily solved, though many able physicists have given it their earnest attention.

Among the instruments that have been contrived to accomplish this result is the chlor-hydrogen photometer, first introduced by Professor J. W. Draper, and afterwards modified by Bunsen and Roscoe. Though this instrument is very beautiful and philosophical in its action, it is open to the objection that it measures rather the chemical or actinic than the illuminating power of a flame. The polariscope photometer of Arago, and the electro-photometer of Masson, are also very ingenious instruments; but the difficulties attending their use have, thus far, prevented their introduction.

The photometer generally employed is that of Ritchie or of Bunsen, and especially the latter. The principle involved in its action is the determination, by well known means, of the relative brilliancy of two lights, one of which is supposed to be invariable. Heretofore, the invariable light, or unit, has been a flame produced by a candle, which is defined as "a sperm candle of six to the pound, burning at the rate of 120 grs. per minute." With this the second flame is compared; and, if it is ten or fifteen times as strong, it is spoken of as being a ten or fifteen candle light.

Though this method is reliable in theory, in practice it is open to error, owing to the variability of what should be the invariable light or unit. If we could always obtain sperm candles possessing the same composition, the indications might be received with a certain degree of reliance; but when we remember that, at present, the so called sperm candles are made of different materials, in different proportions, we see how little confidence is to be placed on a light unit of this description; and it is the object of this communication to detail the results of an attempt to obtain a reliable and invariable light unit.

It is evident that, if a given solid is heated to a certain temperature, it will emit a light of a definite or corresponding intensity. At the same time, the solid will undergo a certain expansion which may be employed to indicate or measure the intensity of the light emitted. I therefore arranged a fine platinum wire so that it was heated by a Bunsen flame, and the amount of expansion and equivalent light determined. It was soon found that, though the arrangement was very well in theory, the practical difficulties in its construction and mode of action were such that it would not answer. I consequently resorted to the following modification, in which measurements of expansion of the wire are not necessary:

A flame of pure dry hydrogen, burning at a definite rate, was caused to impinge upon a platinum coil, when it was found that, so long as wire of the same diameter was used in constructing coils of the same dimensions, the latter, on being subjected to hydrogen flames issuing from burners that were similar in all respects, always emitted a light of the same intensity.

The dimensions of the coils and burners employed in my experiments were as follows: A platinum wire, one decimeter in length, and weighing twenty-five centigrammes, was wound into a close spiral coil of five turns, four millimeters in diameter on the outside. The remainder of the wire was then turned up parallel to the axis of the coil, and terminated in a hook by which it was suspended over the hydrogen flame.

The burner presented a circular opening, one millimeter in diameter. The platinum spiral was suspended over this so as nearly to touch it, and the supply of hydrogen regulated to produce a flame which kept the whole coil at a white heat.

Such an arrangement is easily reproducible in any locality, and when the rate of combustion of the hydrogen is the same, it must necessarily emit a light of the same brilliancy; it consequently provides a light unit, which meets all the conditions of the problem.

The want of intensity in the above described light unit may be urged as an objection, but it is rather an advantage than otherwise, when lights of low intensity are to be examined. If the brilliancy of the light to be measured is very great, any objection on this account is easily remedied by determining the value of an ordinary gas or candle flame in the above light unit, and employing it as an intermediate unit of comparison, from which the value of the brilliant light may be calculated in the proposed light units.

Among the advantages gained by such a light unit is the elimination of errors arising from the variation in the light giving power of the volatile hydrocarbons, produced in the combustion of a candle. According to Dr. Frankland, the luminosity of such flames depends—not on the incandescence of solid particles, but on the luminosity of the gases or vapors produced in the flame during combustion. Since the composition and luminosity of these gases must vary greatly with the temperature, rate of combustion, and nature of the material composing the candle, it is evident that there must be similar variations in the brilliancy of the resulting flame. The use of an incandescent solid, as the platinum wire, avoids this and other sources of error, and reduces the conditions for the production of the light unit to the simplest state.

Tunnel between England and France.

Another project for a submarine roadway under the English channel has been mooted, and a committee of engineers has approved the plan, which is the production of a Frenchman, M. Thome de Gamond. There is novelty in the scheme. It is proposed to tunnel under the channel between New Haven and Dieppe where the distance between the two countries is 64 miles, in preference to between the South Foreland, near Dover, and Cape Grisnez, near Calais, where it is only twenty miles. The reason for this choice of locality is not apparent.

Sheehan's Patent for Steelifying Iron.

In another column we publish the story of Thomas Sheehan, and how he happened to make an invention by which he has accumulated a fortune. Annexed is a list of the railroad companies who are using his process for steelifying iron, and the amounts paid for the privilege:

Chicago & Northwestern	$3,500
Michigan Central	1,500
Chicago, Burlington, & Quincy	2,000
Atlantic & Great Western	1,900
Pennsylvania Central	4,000
Pittsburgh, Fort Wayne & Chicago	2,000
Central, of New Jersey	1,200
Camden & Amboy	1,200
Little Miami, Columbus, & Xenia	800
Schenectady Locomotive Works	500
Chicago, Rock Island, & Pacific	1,200
St. Louis & Iron Mountain	800
North Missouri	800
Lake Shore & Michigan Southern	4,000
Vandalia, Terre Haute, & Indianapolis	950
St. Louis & Indianapolis	800

A number of other railroad companies are using his invention, that have not yet settled with the patentee, but who acknowledge their liability; and still others, against whom suits have been brought in the United States Courts, which have not come to trial. A judgment has been obtained against one of the companies very recently for $12,800, which has not been settled.

IT is a shameful thing to be weary of inquiry, when what we search for is excellent.

Recent American and Foreign Patents.

Under this heading we shall publish weekly notes of some of the more prominent home and foreign patents.

LAMP.—Dr. Franklin T. Grimes, Liberty, Mo.—The invention relates to the class of lamps in which a tube or funnel is combined with the bowl, the said tube or funnel extending from the top of the bowl of the lamp down to within a short distance of the bottom of the same, whereby the bowl is converted into a fountain reservoir, in which, when it is filled, there is a vacuum formed above the surface of the oil or liquid, which is consequently maintained at a higher level than it is within the lower mouth of the said tube or funnel where it is subject to atmospheric pressure. The invention consists mainly in a peculiar arrangement of the valve apparatus, whereby certain advantages are attained in the regulation of the supply of oil to the wick tubes, in filling the reservoir, and in other operations incidental and necessary to the use of the lamp.

INSECT TRAP.—Thomas Wier, Lacon, Ill.—This invention relates to the use of two or more pieces of wood, of any form or size, and fastened together in any way, and either with or without cracks, slits, or crevices made in them, said pieces being intended to be placed among the branches of fruit trees, or on the ground near fruit trees, and to serve as a trap for the larvæ of moths, and other noxious insects,

HANDLE STRAP FOR TRAVELING BAG.—Arthur Alexandre, of New York city.—To the frame of a traveling bag are attached rings, which are preferably made square, as allowing the strap to be passed through them more readily. The strap is made of sufficient length to adapt it to serve as a shoulder strap, and may be made in one piece, or in two pieces connected by a buckle. The ends of the straps are passed through the rings, and are secured to the body of the strap by a button, by sewing, or by other convenient means. To the strap, at a distance from its ends equal to about one third the distance from the ends to the center of the straps, are attached two hooks. The middle part of the strap is made double by having the ends of a short strap attached to it, and has holes formed in the lower ply to receive the hooks. To adjust the handle strap for use as a handle, the hooks are passed inward through the rings and brought upward along the under side of the strap, and hooked into the holes in the lower ply of its double middle part. To adjust the strap for use as a shoulder strap, the hooks are unhooked, and the strap is drawn out to its entire length. Keepers or slides are placed upon the strap, near the hooks, and, when the strap is extended for use as a shoulder strap, are slipped over the hooks to cover them and keep them from catching upon anything with which the strap may come in contact.

FLAG HALYARD.—William Albert, Brooklyn, N. Y.—This invention relates to an improved manner of securing flag halyards; and it consists in attaching them to a weight or traveler fitted on a rod or guide attached to the royal backstays of a ship or other convenient place, or to the flag staff near its base, so that it can rise and fall as the halyards vary in length according to their condition of dryness, thereby always keeping them taut but not overstraining them, as they will be if made fast when becoming very dry and then becoming wet. This plan will not injure the halyards, while it will always keep them taut and trim. In the common way, they will sometimes be altogether too slack, and at others so taut as to be broken by the strain.

THILL COUPLING.—Coleman Bridgman, St. Cloud, Minn.—The object of this invention is to furnish a simple, convenient, and safe coupling for thills of buggies, wagons, etc. It consists in a jointed coupling pin and slotted ear, and also in a slotted washer, arranged to form a simple, durable, and perfectly safe coupling, without screws or spring, that can be adjusted without hammer, wrench, or other tool, without trouble, and in an expeditious and easy manner.

WASH BOILER.—Silas Bennett, Newcastle, Pa.—This invention has for its object to furnish an improved boiler for washing clothes, which shall be so constructed and arranged as to distribute the circulating suds evenly over all parts of the clothes, so as to wash the clothes evenly and avoid staining them, as is the case where large streams of suds are discharged continuously in one place. It consists in the construction and arrangement of the various pipes and distributing tubes, with a flanged and perforated bottom, vertical and cross strips, constructed and arranged in connection with each other, to accomplish the purpose set forth.

FAN MILL.—Alexander Plymate, of Blue Earth County, Minn., administrator of Franklin H. Plymate, deceased.—This is an improvement in fan mills, which consists in a peculiar construction of the feed board, and in the use of a two part shoe for the support of the sieves, the parts being arranged in a peculiar manner, to make the machine effective and compact.

COUPLING HOOKS FOR COAL CARS.—Frank Bush, of Boonton, N. J.—In the ordinary coupling hook the inner link is passed through a hole in the forward part of the shank of the hook, and is then welded, so that when it is necessary to repair or renew the link, the entire hook has to be detached from the car and taken to the shop, where it requires at least three men to handle it upon the anvil while the link is being welded. To avoid this inconvenience and expense, the inventor forms a second or inner hook upon the shank of and just inside of the outer hook. The point of the inner hook extends back parallel with the shank of the outer hook, so as to enter a hole in a plate on the end of the draw bar. By this construction, by loosening the hook, the coupling link or ring may be readily placed in or removed from the inner hook, and when the hook is again drawn to its place it will be impossible for the link or ring to become detached.