The Working Steam Engineer.

While it is true that in every line of manual labor, whether skilled or unskilled, genius and thought are recognizable, and the service of one man is enhanced beyond that of another, still the divergence from the plane of a general average, in most trades, is so slight as to make a standard of wages possible. The working steam engineer is an exception to this condition.

The street laborer may, by care and thoughtfulness, make himself of more intrinsic value to his employer, yet in a general sense his superiority is not materially felt, and a standard of wages for him is possible. Thus, also, in those branches of skilled employment where the labor becomes of a routine character, and where slight variation of subject is necessary, the same conditions exist.

This being the case, it is easy for combinations of tradesmen or labor to establish, by general consent, a code of wages for the guidance of its members. The further removed from that class of labor where bone and muscle are the only elements necessary for success, the more difficult it is to set any standard by which to estimate excellence or make an equalization of payment.

The medical profession may set a standard of payment, the mere physical act of making a visit being the basis from which payment is estimated; but if the absolute service rendered a patient were to enter into a discussion, the question of remuneration would be somewhat difficult to settle.

The mere fact that a man enters a shop and there toils for the allotted number of hours makes it possible to settle his wages by the standard of another man performing a like service; but when the service rendered is the product of thought and study, when the results of mental activity are thrown into the balance against muscular exertion, then the reward can only be measured by the profit given to the employer.

The greater and more varied the knowledge necessary to perform a certain line of duty, the greater the extreme from the inferior to superior talents; hence in proportion is the service rendered increased or decreased in value.

One of the leading English steamship lines, while having one established code of payment for its chief engineers, has a bonus fund, payable monthly to each chief engineer, which payment is determined by the success of the engineer and the absence of neglect on his part in the fulfilling of his duties. Thus each engineer becomes a competitor for this extra emolument. As the business of steam engineering takes to itself certain qualities of the professions, it becomes necessary to gauge the attributes by the same standard—that of especial fitness. To set a standard by which all attorneys were to be paid would at once close the doors to the chamber eminence, and no member of the legal profession would consider the incentive sufficient to warrant him in putting forth the energy necessary to advance beyond mediocrity.

In the employment of men, that class of labor that is purely mental commands higher price than does that class where only physical strength is wanted. One brain may design a steam engine, but more than one is necessary to build it. Hence, then, among brain workers, experience and originality are factors of success. Neither can we gauge a man's worth—commercially speaking—by lapse of time, for one man with frosty locks may have traveled a shorter distance along the highway of observation than his neighbor with half his years.

Certain qualities are always necessary to enable any man to succeed in his vocation, and a man's advancement above his competitor depends upon the magnitude of these qualities.

The working steam engineer is a man in whom must be found executive ability, and in proportion to his ability to execute is his service as an engineer enhanced.

Twin sister to executive ability is self-reliance. The working steam engineer must be endowed with keen perspicuity, so that he may be able to absorb generalities at a glance, and sufficient executive powers to carry out details with correctness and precision. One of the best and most reliable second engineers that we ever met—in marine service—was one of the most inglorious failures as a chief. He lacked completely the attribute necessary to execute. He was so devoid of self-reliance as to hesitate to back out into the stream at the beginning of a new trip any steamer upon which he was chief engineer. A thorough mechanic, and of more than ordinary education, he was in every way a first class man to carry out the details under the general planning of another.

Originality is the cradle in which eminence is nursed, for originality lifts men from the beaten track of the past into unexplored fields, giving the world new productions in science, literature, and art. To succeed, the engineer must be original, and his performing a certain act must not be because some one else did it, but because from his own observation he knows it to be proper and correct.

Not only must the engineer be able to do for himself, but he must plan for others to do; he must be able to direct generalities and execute details; in fact, he must combine the practical and scientific to such an extent as to make it difficult to establish a general standard of payment for his services.—*American Engineer.*

How to Invest Wisely.

The remittance of $3 for one year's subscription to the SCIENTIFIC AMERICAN for the coming year will be a good investment; but there is one that will pay better, and that is to send $7 and receive both the SCIENTIFIC AMERICAN and SCIENTIFIC AMERICAN SUPPLEMENT during 1889; and yet another that will pay still better, and that is to remit $9 and have the ARCHITECT AND BUILDERS EDITION of the SCIENTIFIC AMERICAN included with the above. With the weekly receipt of the two weekly papers, and the monthly ARCHITECT AND BUILDER, the subscriber will have placed before him all the scientific, engineering, and mechanical news of the day, and enough architectural designs and building news to meet the ordinary wants of a person contemplating building for himself, or a contractor who makes estimates of the cost of construction for others.

Energy and Vision.

In a paper on this subject read before the National Academy of Sciences, Prof. S. P. Langley summarizes the paper as follows:

The time required for the distinct perception of an excessively faint light is about one-half second. A relatively very long time is, however, needed for the recovery of sensitiveness after exposure to a bright light, and the time demanded for this restoration of complete visual power appears to be greatest when the hght to be perceived is of a violet color.

The visual effect produced by any given, constant amount of energy varies enormously, according to the color of the light in question. It varies considerably between eyes which may ordinarily be called normal ones, but an average gives the following proportionate result for seven points in the normal spectrum, whose wave lengths correspond approximately with those of the ordinary color divisions, where unity is the amount of energy (about $\frac{1}{1000}$ erg) required to make us see light in the crimson of the spectrum near A, and where the six preceding wave lengths given correspond approximately to the six colors—violet, blue, green, yellow, orange, red.

Color.	Violet.	Blue.	Green.
Wave length,	μ·40	μ·47	μ·53
Luminosity, (Visual effect.)	1,600	62,000	100,000

Color.	Yellow.	Orange.	Red.	Crimson.
Wave length,	μ·58	μ·60	μ·65	μ·75
Luminosity, (Visual effect.)	28,000	14,000	1,200	1

Since we can recognize color still deeper than this crimson, it appears that the same amount of energy may produce *at least* 100,000 times the visual effect in one color of the spectrum that it does in another, and that the *vis viva* of the waves whose length is $0^{\mu}\cdot75$, arrested by the ordinary retina, represents work done in giving rise to the sensation of crimson light of 0·0000000000003 horse power, or about 0·001 of an erg, while the sensation of green can be produced by 0·000000,01 of an erg.

Reproduction of Negatives.

It very often happens that just the very negative one wants for a special occasion or print is either broken or mislaid, much to the annoyance of the serenely unruffled temper of the possessor, more especially if it happens to be a favorite one or if a copy is wanted as a great favor. It is not always convenient to copy a print, supposing you have one from a broken or cracked negative, and every one is the possessor of a copying camera, even of the simplest kind, so that an easy way, if it be an old or an odd one, of reproducing a negative from a print without a camera may prove useful to many who have not all the appliances at hand to do this in the orthodox improved manner.

The print must be an unmounted one, or be dismounted, after which it must be passed through a rolling press on a steel plate, taking great care that it does not cockle, wrinkle, or crease in the process. It may then be gone over and touched up and made as perfect as possible. For the negative get a piece, if possible, of the thin albumenized paper, called long ago negative paper, but if that cannot be got easily, use the ordinary Saxe or Rives paper, the latter by preference. Prepare it by silvering on a strong bath, say of, at least, sixty grains nitrate of silver to one ounce of distilled water, the usual printing bath, in fact. When dry pass it through the rolling press in a similar way to the print, and give it as much pressure as can be given, and be especially careful that no flaw appears on the surface of the paper after it has been pressed, which latter operation, it need hardly be said, must be done in the shade or under yellow light.

The printing frame must have a plate glass, and of a size larger than the size of the print operated upon. Then place the print with the paper side to the glass, the printed side toward the operator; then place the newly prepared paper, which must of course be dry, on the face of the print, close the frame, and see that the contact between the two paper surfaces is perfect, and put as much pressure on as the frame will admit of. Print in the usual manner *through* the back of the print. The time will necessarily be longer than with a negative, or rather with most negatives. Get a good, rich, deep print, which will be negative from the positive print, and if the instructions are attended to, the negative will be as sharp as a film or glass negative, the two smooth glazed surfaces being in intimate—I had almost said optical--contact.

To finish and complete the operation, wash in a flat tray, as if a print in three or four changes of water, and do not tone the negative. The rich brown color of the silver is not only quite sufficient, but far better for printing from than if it be toned. Fix in a strong new bath of hyposulphite of soda, and when thoroughly fixed wash in the usual way, and dry between sheets of blotting paper kept flat. In all the operations be very careful to allow no fold, crack, or imperfection to appear on the resulting negative, as they show in every print taken from it afterward. If the negative is not quite satisfactory, it can now be touched up, worked upon, or improved to any extent. After being quite finished, it is well to pass it again through the press, with the same precautions as before, and then proceed to render it more transparent, durable, and useful, by varnishing. To do this properly it will be necessary to prepare the varnish some hours before it is wanted. Take any clear, transparent, negative spirit varnish—the less color it has the better; see that it is not too thick, and add in the proportion of three drops of castor oil to the ounce of varnish; give it a thorough good shake to mix the oil and varnish together—this confers toughness and elasticity to the varnish, which is invaluable for paper. To varnish the negative, place the albumen side down on a glass, and either with a flat camel hair brush, or by pouring over it, saturate the paper side of the negative first; rapidly dry without cockling, and coat the albumenized side, which takes less care, being more resistant to the penetrating action of the varnish. When *about* dry, place it in a book of clean glazed or writing paper (not printed or printing) with a weight upon it to keep it perfectly flat, and allow it to dry thoroughly, when it will be ready for use.

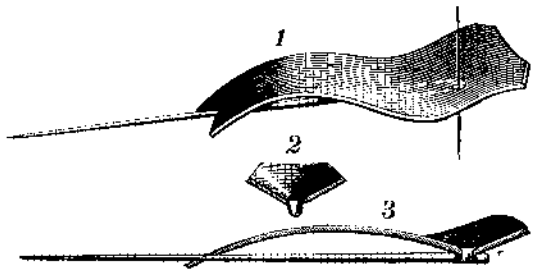
If the thin negative paper has been taken, it may be printed from either side with indifference, the grain of the paper being hardly distinguishable, and for single transfer carbon work does almost, if not quite, as well as a transferred negative with all its attendant risks not only of removal but in handling, the thin paper being much easier manipulated.—*Br. Jour. of Photo.*

A New Floating Exposition.

The Export Society of Germany has decided to build the "Floating Exhibition Palace of Germany," having raised 5,000,000 marks for the purpose. It proposes to build a ship to be called the Kaiser Wilhelm, which will be the work of German shipyards. According to plans, the ship will be 564 feet long, 65½ feet wide, and 46 feet deep. It will have four engines propelling as many screws. The material will be principally German steel. The cost of a two years' tour is estimated at 3,150,000 marks. The income from the rented space —1,000 to 1,200 marks for each booth—and from sales will be, it is thought, at least 7,260,800 marks, leaving a balance of 4,110,800, or over 2,000,000 marks annually —a pretty sum on the pages of the ledger. Emperor William it is said has promised his aid to the enterprise, and it is hoped that the vessel will sail from Hamburg on her first voyage in the spring of 1890.

A SIMPLE DEVICE FOR THREADING NEEDLES.

The accompanying illustration represents a device designed to facilitate the threading of a needle, which has been patented by Mr. August Scherkenbach, of Shakopee, Minn. The device consists of a spoon-shaped plate provided in its bowl end with a central aperture, flanked at the bottom by two projections fitting into the eye of the needle, and having at its other end a notch forming a resting place for the shank of the needle. The operator, in threading a



SCHERKENBACH'S NEEDLE-THREADER.

needle, places it on the under side of the plate, so that the projections, as shown in Figs. 2 and 3, fit into the eye of the needle, when the end of the thread, being passed into the bowl, finds its way readily through the central aperture and through the eye of the needle.