### Whitewood.

Whitewood is gaining favor rapidly. Not many years ago it was used in this vicinity chiefly for coffins and wagon box boards. Farther south, in the sections where the wood grows, it has been used for finishing to considerable extent, but builders who could readily get white pine discarded whitewood.

Until recently, for finishing purposes, and for the manufacture of sash, doors, and blinds, whitewood was little thought of north of those sections where it grows plentifully. A representative of one of the largest sash, door, and blind factories in the country recently said in this office that if he were building he would have little choice between pine and whitewood for the purposes above mentioned. He admitted that his interest is purely identified with white pine, and that he would not admit openly that whitewood is the peer of pine; such, however, in his opinion, is a fact. This is a big admission to come from such a source, but one that is based on a good foundation.

It can be easily understood why whitewood can be used successfully for many purposes for which pine is employed. It is more inclined to twist than pine, but this is not much of an objection where it can be used in small pieces, or if in large ones, securely fastened. Even gum, the most rebellious wood that grows out of the ground, if properly nailed, answers for finishing admirably. Whitewood is very easy to work—it probably ranks next to pine in this respect—takes a good finish, and makes a close joint. There are complaints against cypress for sash, doors, and blinds because, it is said, it is too hard a wood to drive together and make a perfect joint. Too much work must be put on the pieces where they come in contact to cause them to fit closely. In pine work this extra work is unnecessary. The wood is so soft that it readily gives, and the tight joint is at once produced. There are others who claim that such a fault with cypress does not exist; but that it does somewhat there can be no question. Not that perfect cypress sash, doors, and blinds are not made, but it requires a little more attention and labor to make them than it does from pine.

In regard to softness, whitewood probably ranks next to pine; it is not quite so easily worked as pine, and a little more easily than cypress.

The easiness with which whitewood can be smoothed is greatly in its favor, as it is prepared at light cost for the paint. Its ability to hold paint well is questioned, and justly where the lumber is used on the outside of a building. Place two boards, one pine and the other whitewood, side by side in an exposed condition, and paint them at the same time and with the same number of coats, and the pine without question would look the better for the longer time. For inside work, though, any difference that may exist in this regard would not count for enough to take into consideration. The paint holding quality of whitewood is good, while in white pine it is extra good.

The cost of whitewood is decidedly in its favor. When clear whitewood can be bought for $20 per thousand less than clear pine, the difference shows up in the light of a big inducement to the consumers of lumber. With many there would have to be big advantages in favor of pine to counterbalance this difference in price. Twenty dollars in a thousand feet of lumber is a good deal of money, and when such a difference exists there ought to be more points in favor of the higher priced lumber than in this case really exist. As the prices of the different kinds of lumber are now ranging, whitewood, considering its value, is the cheapest finishing lumber to be had.

With the popularity that whitewood is winning it is not to be wondered at that whitewood stumpage is increasing in value, and it may be expected to be worth still more. Not many years ago it did not take much money to buy as much timber as any man cared to own, and few cared to own much; but now it is sought not only where it can be immediately got at, but in the out-of-way places which will necessitate the timber standing until improvements in streams and in the way of building railroads are made. It has also come to light that it is not so plentiful as many, a few years ago, supposed it to be. In some of the best Tennessee districts a good share of the available whitewood has been cut; a big proportion of it, when it is considered how short a time the whitewood mills have been at work.—*N. W. Lumberman.*

### New Style of Parlor Car.

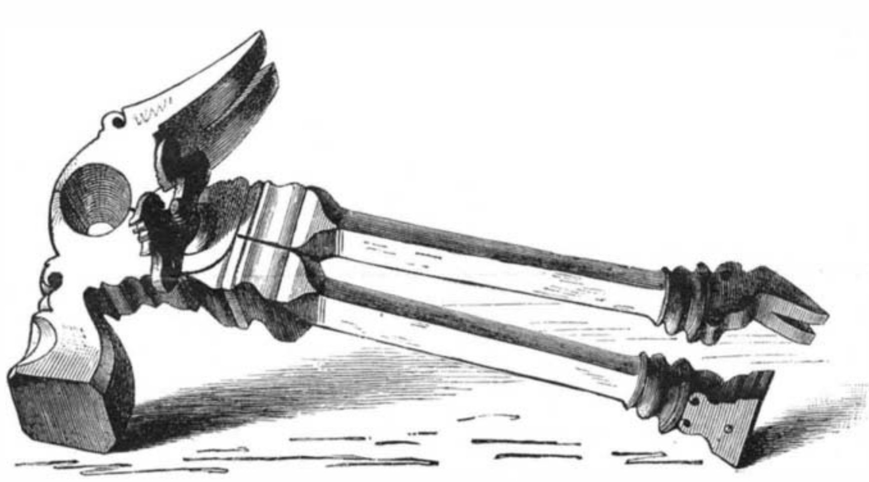
The Pennsylvania Railroad Company have had built at their Altoona shops a parlor car, No. 901. Its dimensions are 62 ft. in length, 9 ft. 10 in. in width, and 9 ft. from the floor to the upper deck of the roof. It is constructed upon an entirely new plan. It contains five separate compartments, retiring rooms for ladies and gentlemen, one at each end of the car, the main parlor, a ladies' boudoir, and a smoking room. The parlor contains four movable rattan chairs, fourteen fixed chairs, and a sofa, a seating capacity of twenty-one. A noticeable improvement is the manner in which the fixed chairs are secured. They are balanced on a handsome brasswork pivot, and furnished with two gracefully curved brass legs at the back, which upon the occupant reclining and the chair touching the floor and giving the chair stability, prevents unpleasant swinging from one direction to another when turning sharp curves, and at the same time readily permits the chair to be moved while in that position, as the feet of the legs are formed of easily moving rollers.

The boudoir is 7 ft. by 6 ft., and contains a lounge and three rattan chairs. A wooden partition of the height of the window sills separates it from the parlor, and entrance to it is obtained through a highly ornamented gate. Rich curtains, of fine plush, of a *gendarme* blue, supported by rods attached to a framework of oak, afford the means of securing to the occupants perfect privacy if desired.

The smoking room is 12½ feet by 6 feet. Partitions reaching to the roof divide it from the other portions of the car. A novel arrangement of the windows has been adopted. Instead of the old style flat window, there are five bay windows on each side, each window about 7 ft. in width. The center light or outer glass of each window is within the outer line of the car, and from it two panes deflect inwardly in opposite directions. This arrangement affords not only a greater lighting surface, but enlarges the prospect from the window, and, it is claimed, ventilation and air can be secured without the introduction of cinders by opening the rear panes of these windows, thus forming a draught outward from the interior. The interior woodwork is oak, prepared to resemble English oak. There is no frescoing or veneering, but the ornamention consists of elaborate carving and beautiful repousse brass work, exquisite chandeliers of brass, cut globes, rich upholstery and carpets, delicately stained glass ventilators, all harmonizing delightfully and giving a most pleasing air of solidity and comfort. The exterior is painted in the standard red of the company; the guards and railings of the platforms are nickel plated, and the body of the car rests upon two six wheel trucks, larger than ordinary, the introduction of an additional spring giving greater ease.

### AN OLD UNIVERSAL TOOL.

Several years ago a so-called "universal tool" was advertised everywhere as an American invention, and this tool is still bought by many people who wish to busy themselves in a practical way, but have not had sufficient experience to know that such an implement is not convenient. It is interesting to know that this "novelty" is very old, and had died out of existence until the modern imitation of old things brought it to light again.



AN OLD UNIVERSAL TOOL.

In the collection at the Flechtingen Castle, among other things, is the "universal tool" shown in the accompanying cut, taken from the *Illustrirte Zeitung.* This implement is at least three hundred years old; it is almost nine inches long, very heavy, of very good workmanship, and bears traces of having been gilded.

### Electricity and Light.*

Electricity appears almost to realize for us one of the oldest and most striking of the representations of creative power, "Let there be light, and there was light." In most of our other sources of artificial light we appear to consume something which to the ordinary mind is converted into light. Here we have to all appearance light produced out of nothing, or as the next step from the ordinary unscientific reasoning to that of partial scientific enlightment, *electricity converted into light.* A further advance in knowledge teaches us that—1. Electricity is not converted into light; 2, that no illuminating agent is so converted; 3, that light does not exist at all; that it is not *a thing,* but the *perception of an action.* The light is in the eye itself.

2. *Light is a function of energy,* and its study involves four considerations—1. The phenomena of its origin; 2, the mode of its transmission across space; 3, the nature of its perception; 4, the energy expended in these several processes. Each of these calls for and will be worth some little examination; but inasmuch as one of the great dangers of science is the acceptance of *words* (which are worthless except in so far as they convey a definite meaning) in the place of realities, it will be well to begin at an even earlier starting point. Electricity itself is a word which we all use, and which too many employ as though it were one of the old "words of power," the mere utterance of which is in itself sufficient to place the powers of nature under subjection. Yet what conflicting ideas exist as to what the word really means, and how few could give a really intelligible explanation of what they mean by it. That task we need not now attempt; but the latest of these magic names of science which we shall have much occasion to use calls for some particular consideration.

3. *What is energy?* We have outgrown the intellectual stages at which men invented a specific fluid to answer such a question, and we recognize that we cannot say what anything *is;* we can only state the idea we form of it from its actions; we have no conception of energy except as a relation of matter and motion. It may be either expressed as the work capacity of matter in motion, or of matter under a stress capable of generating motion. But the essential feature of the modern scientific ideas as to energy is the recognition that it is uncreatable and indestructible. We can form no concrete idea of its nature; it is best conceived as *motion,* yet it is impossible to even conceive of motion apart from matter. It must therefore be recognized as an attribute of matter, yet distinct in its origin and nature, because it is transferable from one mass of matter to another, and even to that more intangible something, the *ether.* It is here, in fact, that the most usual explanations of energy fail us; we can form some sort of idea of energy in the form of work imparted to or effected by a moving mass of matter, but the imagination fails in realizing the existence of vast stores of energy in mere space. It is a relief to accept the "ether," of which we know nothing, as almost representing the underlying essence of all things—the *substance* of metaphysics, endowed by the mathematician with the properties of an elastic solid, possessing none of the attributes of *matter* itself, while it is interchangeable with matter in the relations of energy.

4. *Kinetic energy* appreciable as work is the natural starting point of the endeavor to reach the unseen. A cricket ball struck by the bat gives us a perfect picture of the nature of energy, for it shows us an inert mass of matter suddenly endowed with motion, and with the capacity of doing work in consequence of that motion. We know that this capacity of doing work has been imparted to it from the muscles which moved the bat, that it is partly expended in friction of the air during its transit, and that if the motion is suddenly arrested some considerable results may be produced; in fact, the ball has received, has transmitted, and has transferred that something which modern science calls "energy," and which is one most important element out of which modern science is constructed.

5. *This energy can be definitely measured.* But here we should clearly recognize that, while professing to measure a thing which has after all no conceivable existence, we are measuring, not the thing itself, but an effect it produces. This not an idle truism, for probably few people realize that it applies to all measurement, to all our knowledge. The most concrete idea—apparently—is that of matter, and the most apparent of our conceptions of matter is its *weight,* or in scientific terms, its mass. Yet, when we weigh a thing we are *not weighing matter itself,* we are merely measuring a *force exerted by it.* In ordinary cases we simply measure the mutual forces of attraction of the earth and the object.

6. *The most concrete measure of energy* is furnished by this very attraction, viz., the unit of mechanical work, the foot-pound, the energy imparted to a pound weight while moving through one foot of space under the force of the earth's attraction, or which must be expended in lifting that pound weight against the earth's attraction.

7. *Heat gives us another concrete unit* in the quantity of heat, which is now known to be an action of energy, necessary to raise one pound of water one degree of temperature. Here again, however, we have to recognize that we cannot measure a thing itself, but only its effects. We speak of a *quantity of heat,* but we never measure *heat itself;* we measure either a temperature effect, variable in every separate substance, and necessary to be ascertained by experiment, or we measure an expansion effect variable also in every substance except in pure gases.

8. *The correlation of the forces,* the knowledge of which is the greatest achievement of this age, as far as pure science is concerned, because it is the starting point of progress of discovery in all directions, means that many actions which used to be attributed to special fluids or *forces* are merely different manifestations of *energy.* It follows, therefore, that one unit of energy can represent all these actions; that is to say, that just as a quantity of heat contained in a mass of red hot iron can be expressed in terms of the number of pounds of water it will raise 1° F. in temperature when the relations are ascertained, so can it equally be expressed in foot-pounds of mechanical work once the interrelation of these actions of energy is ascertained.

9. *The action of heat on a pure gas* is the most apparent evidence of this relation, although not the one by which it is usually illustrated. We can impart heat to a gas in two ways: 1. The gas being inclosed in a rigid vessel and heated, a certain number of degrees exhibits that heat in the form of temperature, just as water or iron does; this is the *heat of constant volume.* Under these circumstances a force is also developed—a pressure or tendency to expand. 2. The gas may be allowed to expand freely while heating, and will now absorb what is called the *heat of constant pressure.* Now, if we pass the gas into a calorimeter, we shall find that the heat of this second case is the greater by a

* John T. Sprague in the *Electrician* (London).

measurable quantity. But as the same quantity of gas is at the same temperature in each case, how has this excess of heat been disposed of so as not to be apparent, and yet capable of being recovered? Something else has been done besides heating the gas; the art of expansion involved the lifting a column of the atmosphere, and this work can be measured in foot-pounds. This work therefore represents the energy corresponding to the difference of the two heats. Various experimental conversions have been made resulting in the two figures of 772 foot-pounds and 1 pound 1° F. of water, which are received as the "mechanical equivalent of heat;" that is to say, the same quantity of energy will appear as either of the two forms, and one pound of water falling 772 feet would be heated 1° if it could be stopped so as to retain in itself the whole energy of the earth's attraction.

10. *Potential energy* is more difficult to conceive than kinetic, but our cricket ball may furnish some ideas. When it is flying through space it is not doing work, except as friction in the air; but it has the capacity to do work, and this friction work is a gradual exertion of that capacity. Its motion at each instant is therefore the measure of its remaining capacity, and is in fact the consequence of and the evidence of the energy *potential*, or latent in the ball. Now the unscientific mind would imagine that this energy was created by the striker, the production of his will; but science knows that the player no more created the energy than the bat did. The player in exerting his muscles burnt away a portion of their material or consumed some of the substance stored in his blood and derived from his food; in fact, he corresponds in function to a steam engine and boiler fed with coal. We come then to the result that he simply transferred *potential* energy to the ball, converting it first into *kinetic* energy or mechanical work in his muscles. The food itself simply stored up energy derived from the sun's beams, because the process of vegetable life is a continual *unburning* of hydrogen in water and carbon in carbonic acid, and the setting free of oxygen in the air, a process which requires an equivalent of energy to be imparted to the atoms, which energy they give up on their reunion, whether in the lungs and muscles of the cricket player or the boiler of the steam engine.

### Boiler Settings and their Defects.

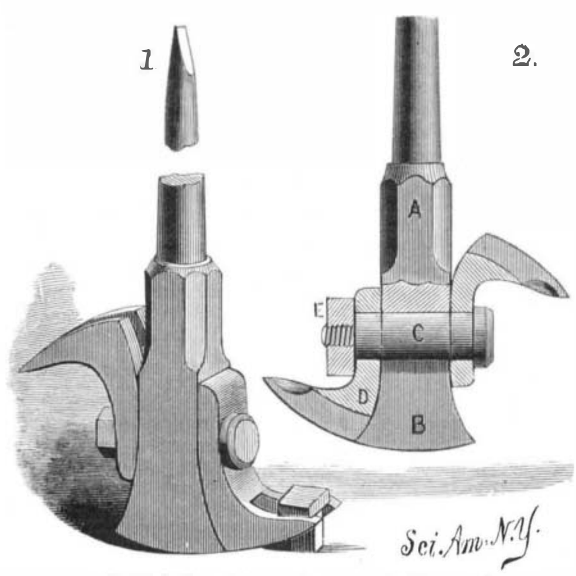
The *Locomotive* is a small sheet published monthly by the Hartford Steam Boiler Protection and Insurance Company; every issue contains a list of the boiler explosions and such other casualties, pertaining to steam appliances, which have occurred during the month prior to the issue of the paper.

The officers and engineers connected with the above company, from their experience derived in the inspection of boilers and their business as underwriters in this kind of risks, have more than ordinary opportunity for knowing which class of boilers are the best for the work required of them, as well of the best mode of setting them and the best attachments for insuring economy and safety. The May number has an article condemning the running of flues over the tops of boiler shells, as follows:

"One would naturally suppose that when the number of boilers that have been ruined, and the still greater number that have been seriously injured, by this form of setting is taken into account, no one would think of setting new boilers in this manner. Yet it is done every day, and by intelligent and experienced men too. The argument used in its favor, that the passage of the hot gases over the steam space superheats the steam, and thereby renders it more economical, is a plausible one, and doubtless leads many steam users to adopt this form of setting; but if the circumstances are carefully examined, the argument will be seen to be fallacious. It will be impossible to superheat steam when it is in intimate contact with such a large surface and body of water as it is in the case of a tubular boiler. Moreover, it will be difficult for any one who has in mind the poor conductivity of ashes to see (when looking into one of these flues after it has been running a few months) how superheating of the steam can occur. Our experience with this form of setting (and it is a somewhat extensive one) points to this: So long as the brickwork at the sides of the boiler is perfectly intact, so as to *compel* all the gases of combustion to pass through the tubes before they reach the top of the boiler, and the water is good, the influence of the flue is *nil*, because, if the boiler is properly proportioned, the temperature in the flue cannot much exceed that of the steam in the boiler, and if the boiler is badly proportioned, the deposit of ashes which soon collects on top of the shell protects it, in a great measure, and this very protection is sufficient to prevent any superheating of the steam. But as soon as the side walls begin to heave, as they almost always do, and crowd away from the boiler shell, *then* the fire takes a short cut up past the side of the boiler into the flue, the draught is sufficient to carry away the ashes at the points where the openings are, and the exposed portion of the shell gets "scorched." Sometimes, when the feed water is very acid, the overheating, while hardly violent enough to burn the plates, is just sufficient to bake all scum on the surface of the water on to the shell above the water line, beneath which coating corrosion goes on with surprising rapidity. We have seen boilers set in this way, with a coating several inches thick above the water line, after they had run only a year, beneath which the plates were eaten nearly half way through, while other boilers in the same room had been running under the same circumstances, with the single exception that the flue did *not* pass back over the shell, for upward of fifteen years, and only showed very slight traces of this action. This seems to us to be conclusive evidence of the injurious action of this form of setting, aside from the liability, at any time, of the side walls becoming so badly disarranged that actual overheating and fracture therefrom may occur.

### IMPROVED CLAW BAR.

An invention patented by Mr. Hugh Robertson, of Breckenridge, Minn., relates to claw bars for drawing spikes from railroad ties and for similar uses. Fig. 1 is a perspective and Fig. 2 is a sectional view. The bar is chisel shaped on the extremity of the handle, and upon the opposite end is formed a convex head having concave sides. The end of the bar is slotted to receive a bolt that clamps the auxiliary claws to the sides of the bars, the inner faces of the claws being curved to adapt them to the concave sides of the head. The points of the claws extend outward

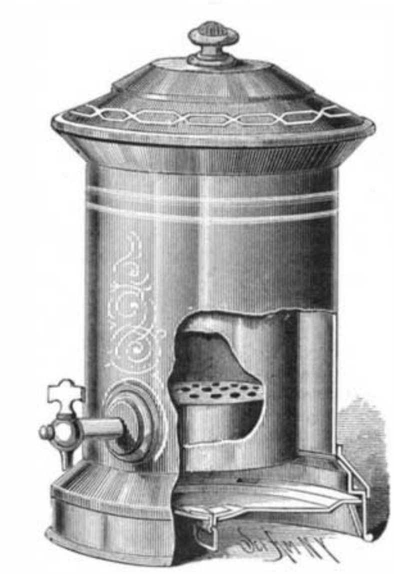



ROBERTSON'S IMPROVED CLAW BAR.

from the sides of the bar nearly at a right angle, and are slotted to receive the body of the spike to be drawn. The claws, near their points, are countersunk to receive the head of the spike, and the sides of the bar are similarly countersunk. The claws may be both clamped in position for use, when the head of the bar and the outer surface of the claws will form a curve of long radius. The bar may be used without the claws, or one of the claws may be attached in position for use and the other reversed. The bolt is flattened and fitted to the slot in the bar and to oblong holes in the shanks of the claws, which are thus prevented from turning. The chisel at the end of the handle can be used to form a cavity into which the claw may be inserted if there should be any difficulty in getting under the head of the spike.

### WATER COOLER.

An invention recently patented by Mr. J. E. Welling, P. O. Box 100, Georgetown, Ky., is shown in the accompanying cut. The space between the removable water tank and the shell is filled in with some good non-conductor of heat. The faucet passes through apertures in the tank and shell, and is provided with annular shoulders which are kept pressed



WELLING'S WATER COOLER.

against the outer surfaces by a nut screwed upon the inner end of the faucet. On the back of the outer shoulder are two lugs which enter notches in the edge of the aperture in the shell, and thus prevent the faucet from turning.

The shell is provided with a removable bottom having a folding handle upon the under side. On the edge of the bottom is a series of notches, and the base of the shell has a corresponding number of lugs. To secure the bottom in position it is so placed that the lugs pass into the notches when it is turned so that its rim, between the notches, rests over the lugs. After the tank has been secured in the shell, the whole is inverted, the space is filled with sawdust, mineral wool, or other non-conductor, and the bottom fastened in place.

### Antimony in Dyed Cotton Yarns.

BY DR. CARL BISCHOFF.

As is well known, it is at present a frequent practice to fix aniline colors on cotton yarns intended for stockings, etc., by means of tartar emetic and tannic acid. Commonly the yarn is first drawn through a sumac bath and then run into water containing the dye, together with the necessary quantity of tartar emetic in solution. In this way a tannate of antimony is formed, which is found to adhere well to the fiber, and acts as a fixing agent for the color, consequently the majority of dyed stocking yarns of all classes above the lowest contain appreciable quantities of antimony. Soluble antimony compounds, especially tartar emetic, when applied to the human skin in suitable and sufficient doses, cause a peculiar cutaneous irritation and inflammation.

Now, although the above mentioned method of fixing anilines may almost be called fast, owing to the colored antimony compound being difficultly soluble or pretty insoluble to water, yet under certain circumstances, among which may be mentioned insufficient rinsing, by no means unimportant quantities of soluble antimony compounds, more especially of tartar emetic itself, may remain in the finished yarns. In the last few months of 1883 a large firm of cotton stocking yarn dyers was induced to institute a research on a considerable collection of samples dyed in baths containing tartar emetic. Complaints of injury to health, etc., resulting from wearing miscellaneous goods which had been manufactured from these yarns, were the cause of this step being taken. The intention was to have determinations made of the quantities of antimony which might remain in such yarns after skilled dyeing and proper rinsing, also of the extent to which the aniline antimony tannate lakes remain soluble in water, and finally to ascertain how much antimony could be got out of the aforementioned lakes on the application of energetic dissolving agents.

The samples examined were fair average ones, not specially treated nor specially selected. After extraction of weighed quantities of yarn by means of hot water, the antimony was determined both in the aqueous extracts and in the yarns remaining therefrom. Digestion with concentrated muriatic acid, sometimes after addition of chloric acid, was the means employed for solution of the antimony firmly held in the yarns. Sulphide of ammonium was the precipitant employed, and when weighable quantities were obtained the precipitate was converted into and weighed as antimony pentoxide. The following scheme clearly and concisely exhibits the results obtained:

ANTIMONY IN DYED COTTON YARNS.

(Traces not determinable quantitatively.)

| Color of Sample. | Soluble in Water. Per cent Antimony. | Soluble in Acid. Per cent Antimony. |
|---|---|---|
| 1. Bluish violet | traces | 0·11 |
| 2. Red (Bordeaux) | traces | 0·26 |
| 3. Dark violet | 0·012 | 0·12 |
| 4. Light reddish brown | traces | 0·24 |
| 5. Pure blue | traces | 0·13 |
| 6. Dark blue | 0 008 | 0·25 |
| 7. Light red (Bordeaux) | traces | 0·18 |
| 8. Bluish violet | traces | 0·10 |
| 9. Scarlet | 0·008 | 0·22 |
| 10. Dark red brown | traces | 0·244 |
| 11. Dark red | traces | 0·31 |
| 12. Red brown | 0·0135 | 0·30 |
| 13 Scarlet | 0·014 | 0·20 |
| 14. Light blue | traces | 0·036 |
| 15. Water blue | traces | 0·11 |
| 16. Orange brown | traces | 0·121 |
| 17. Brownish violet | traces | 0·20 |

It is well to be borne in mind that the weight of a pair of ordinary cotton stockings is about from sixty to seventy grammes. Hence the antimony contents of such articles made from these yarns would be with a maximum say 0·25 gramme. Only the quantity of antimony which is soluble in water can in this case be of physiological importance, and, according to the above table, this amounts to a maximum of 1 5 centigrammes per pair of stockings. We leave it to medical experts to figure out the influence on the health of the individual exercised by these quantities of antimony. We, however, do not by any means deny the *possibility* of cutaneous irritation, etc., in cases where the dyeing has been done in a loose, slovenly manner, no care given to the indispensable rinsing, and consequently the percentage of antimony soluble in water rendered comparatively high.—*Tex. Manuf.*

### New Telegraph Cables between Europe and America.

A new cable is now being laid between Iceland and Nova Scotia, thence to this country, by Messrs. Bennett and Mackey. The cable used in the present enterprise is undoubtedly the best that has ever been made, representing the accumulated experience gained in the construction of all previous ocean cables. It was manufactured by the Messrs. Siemens at their works near London. Upward of 2,500 men are employed in the establishment, and 1,700 of these were employed on the present cables, for there are two of them, two to extend side by side from Ireland to Nova Scotia, whence one goes to Rockport Mass., and the other round Cape Cod to Fire Island, N.Y., and thence to New York. The aggregate length of the two is over six thousand miles. The shore ends are two and one-half inches in diameter, while the cable proper is but one inch in diameter. The conductor is formed of thirteen wires, consisting of twelve small wires coiled around a central wire one-tenth of an inch in diameter. The insulating material is gutta-percha, between which and the armor there is a cushion of jute.