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NEW BLUE COLOR WANTED.

For army clothing, blue has been more universally adopted than any other color. It is possible to dye cloth this color by several processes and different substances; but the exigencies of a soldier's life demand that the color of his clothing should be permanent—that is, unchangeable by exposure to the sun and weather, and the action of alkaline solutions used for washing. Hitherto, only one substance has been generally used, possessing the best qualities for producing this color. It is known by the name of indigo, and is manufactured from a plant into small hard cakes, in which condition it is transported from tropical and intertropical regions, where the plant is cultivated. As a coloring substance, indigo has been employed in Africa, Asia, and South America, from time immemorial. The color which it imparts to cloth possesses the excellent quality of appearing fresh as long as the fabric endures. Within the past two years, the demand for blue army cloth has been so great, that it has been difficult to obtain a supply of indigo for dyeing; more especially as the best qualities of the drug have of late years been imported from sections in the East Indies, where there have been serious disturbances among the native cultivators of the plant. Its price—at all times high—has advanced from one dollar and a half to two dollars and a quarter per pound; and a sufficient quantity of the best qualities cannot be had at all. The introduction of a cheaper substitute for this material, would be of great importance to the community; and would undoubtedly realize a fortune to the inventor.

Within the past three years, colors manufactured from the products of coal tar, have come into very general use, and have superseded colors that were formerly derived from decoctions of various plants and "dye-woods." But the range of these new colors is limited, being chiefly confined to shades of purple and red. It is true that emeraldine—a green coal-tar color—has been manufactured; and also blue—termed *azuline;* but the latter does not possess the durable qualities of that produced from indigo. Still we think that this is the direction to which the chemist should look, as the most hopeful field in which he can labor for obtaining a substitute for indigo. The base—aniline—of coal colors was first obtained from indigo by distillation. Rosaniline is composed of C_{20} (carbon), H_{19} (hydrogen), N_{13} (nitrogen); and blue indigo is composed of C_{16}, H_{10}, N_2 O_2 (oxygen). What is called "white indigo" simply contains two atoms more of hydrogen than the blue indigo. There is therefore a close relationship between these colors and substances. The aniline blue which is now made for dyeing silk, is manufactured from the rosaniline products, by acting upon them with acids, under heat, in a close vessel; so that it is reasonable to conclude that a perfect substitute for indigo may be made from the products of coal tar. It is also much to be desired that the new blue color should be as easily applied to woolen fabrics, as the new red and purple colors are dyed upon silk and wool. These require no mordants; the fabric is dyed by simple immersion in a warm bath of the coloring agent. In dyeing wool with indigo, the vats for the goods are very difficult to manage, and are easily spoiled, because the indigo requires to be deoxodized by fermentation, before it will yield its coloring matter to cloth. Woad, bran, madder, &c., are employed as fermenting agents, and much experience and great skill are necessary to manage the operations. Large quantities of indigo are frequently rendered useless, for want of a little care and skill in preparing and managing indigo vats. A new color may be produced to obviate these difficulties, by which blue cloth may be dyed as permanently as with the best Bengalindigo. Never before has our country presented so great a prospect of reward to the discoverer of such a color. Our home woolen manufactures have increased to a prodigious extent during the past two years; and they must attain to still greater importance, as they are necessarily taking the place of cotton fabrics for many purposes.

THE BODY AND THE MIND.

By the exercise of a very little reflection we shall discover that the mind and the body are both dependent on each other. The mind, more especially, upon the physical structure; for without stimulant from bodily vigor, the brain refuses to work and thought is paralyzed. These are truisms, and are not put forth as embodying any new and startling doctrine. They are so true that all thinking men know the force of the remarks, but fail to take any steps to practice what is suggested by them; for when a man is told that his mind is weak, it implies bodily waste, and he must of necessity recruit the one to improve the other. This article is no plea for gymnasia, or other similar institutions; in fact we look upon these as the last resort for restoring lost animal strength, and invigorating the wasted tissues and muscles of the body. Rather do we seek in these lines to impress upon every person engaged in sedentary pursuits, the absolute need that exists for sensible and diverting bodily activity.

How does the case stand: how do men in general spend the few hours they can spare from business? Let the reader look around among his acquaintance, or ask himself, and he can see clearly that but few persons give the attention they ought to this subject. One individual for instance stands all day in his store, bends over his desk, and wearies out his body and mind by close attention to business. Possibly, at five o'clock he goes home, because he can't stand the strain any longer: what does he do then? He plays five minutes with his baby, or else doses in the corner over a newspaper, all doubled up like a jack-knife. Still other men of business snatch a hasty minute to dine, and come home at night, only to pore over ledgers and business accounts without end. These plans may be very excellent ones to get riches by, but there are demands of the body to be attended to, which neglected, all the wealth in the world cannot compensate for. The obvious remedy is to give each function and organ of the body its proper degree of care. The millionaire will not consent that his horses shall stand idle in the stable, for he knows that by so doing they lose in beauty and spirit; yet he denies to his own body what he recognizes as indispensable for the animal, and suffers his energies to waste for want of use. The mechanic who has an overabundance of muscular exercise, requires intellectual food, that his brains may develop and his ideas be enlarged; while the reverse is true of literary men.

In the beginning of this article we mentioned gymnasia, and their influence; we think that one great feature in developing our frames is too often overlooked, and that is the degree of interest or sympathy an individual has, in his efforts to become robust. Most persons will concede that if a man forces himself to walk about in a pen, open to air and sunlight, for a certain period, he will not necessarily present a picture of perfect health; and that mere tramping over a stated number of miles may not always bring him in sight of the fountains of youth. But let nature inspire the heart of man with all her beautiful sights and sounds; let him feel the sweet influences of the landscape filling his heart with joy and gratitude; and then a walk of half a mile is better for his body than five miles under other circumstances. It is not so much what we do for the restoration of lost physical energy, as *how* we do it. Active exercise is in fact only another name for recreation; and that this is imperatively necessary to a healthy body all will admit. Outraged nature inflicts sore present punishment upon men for their neglect of this law, as well as future unhappiness, in a line of degenerated and figuratively emasculated descendants.

RESISTANCE OF ARMOR VESSELS.

The London *Daily News* lately contained a long communication from Rear Admiral Halsted, R. N., in which he discussed the merits of the different armor-clad vessels that have been built, and those now being constructed for the British navy; also the effect of shot and shell upon them. He states that those ships which have been built with eighteen inches of teak wood, behind 4½-inch iron plates, exhibited greater powers of resistance to round shot, from smooth bore guns, than ships having 5½-inch plates, backed with only 9 inches of teak. But none of these vessels, he asserts, are proof against Whitworth's 130-pound shells, fired at a distance of 800 yards, with 27-pound charges of powder. He advocates, however, an inner skin of plate, behind all the wood backing of armor vessels, as being a great protection against splinters, and rendering the interior of the vessels fire-proof. The inner plating behind the wood of the frigate *Warrior*, and other broadside British iron clads, is ⅝ths of an inch thick. A greatly increased thickness of this inner plating is suggested. With respect to broadside and cupola, or turret armor ships, Admiral Halsted considers the latter superior. He says: "Of the plans now before us, the cupola ship bids higher than any other, as against both ships and forts, to become the type of future maritime strength. With unapproached facility for carrying and working the heaviest practicable guns, able to be burdened with the heaviest reasonable armor, freed for equipment with the highest powers of speed and sail, and with promise of superior sea-boat qualities, the cupola ship, as a true British invention, claims every support and encouragement the country can extend to her talented inventor, in his arduous struggle for her speedy, complete and successful development, as the future floating symbol of our naval power."

The little touch of national vanity about "the true British invention" may be overlooked, for the sake of the qualities which he points out as necessary to make such vessels truly effective. They must possess a high speed and be good sea-boats. None of our *Monitors*, yet constructed, possess these qualities, but several of those now being built will be good sea-going vessels; and it is expected they will have a high speed. We have constantly urged upon our naval authorities the positive necessity of high speed in any war steamer, to render it effective.

DECORATING MACHINERY.

The external appearance of some kinds of tools and utensils attracts public attention at once, and provokes criticism of a more or less favorable nature; according as the embellishment is in good or bad taste. In respect to the ornamentation of machines many different opinions exist. There are a certain class of manufacturers who build their machines without any attempt at decoration, and who reject all outward show, as detracting from the real merit of the article—which lies unquestionably in its capacity to do the work it was designed for. Yet another, and in this country a very numerous class, so overload their mechanism with paint, gilding, and gewgaws, that the appearance becomes tawdry in the extreme, and detracts very materially from the pleasure one experiences in looking at what may be an otherwise well-designed and efficient machine. Some locomotive engine tenders we have noticed, are so covered with a maze of scrolls, scratches, and dabs of paint, beginning nowhere, and ending in the same place, that one cannot but think the ghost of some crazy artist had risen at the dead of night, and wandering at random over the innocent iron, left traces of his revel in wild meaningless blotches and patches, without character or purpose.

It seems to us that in all cases where the ornamentation of a machine is determined upon, a safe rule would be to consult the well-established laws of design (and common sense also), before perpetrating abortions which will, perhaps, live long after the offender against good taste has departed. All appar-

atus intended to be placed in an obscure corner, or those parts of machines which are not seen, require no outward adornment: but in other cases, where perhaps hundreds of persons daily use the apparatus, and the whole world, so to speak, criticises and comments upon its appearance, a tasteful and appropriate exterior adds, not only to the beauty of the machine, but to its value; and is at once a mark of enterprise and an evidence of the maker's cultivation.

COST OF MODERN NAVIES.

The French naval architect, M. Xavier Raymond, in his book on "Les Marines de la France et de'l Angleterre," describes the enormous cost of modern navies, as compared with those of other times, when sailing vessels alone were employed. In the days of Nelson, it was calculated that the number of guns carried was a criterion of the cost of a vessel, and that the cost of each gun was £1,000 (about $5,000.) For steam wooden frigates, the cost per gun is now rated at from £5,000 to £6,000, and for iron-plated frigates it exceeds £10,000. Again, the expense of maintaining a modern steam frigate is almost fabulous compared with the old sailing craft. The *Edinburgh Review* states that the *Warrior* frigate, ready for sea, represents £400,000 ($2,000,000) of the public money; while the *Minotaur* now building, and to be covered with 5½-inch plates will represent $2,500,000. As this thickness of plates has been shattered by guns already in existence, it is now proposed to build other vessels with 8 and 10 inch plating, in which case a single ship will cost about $5,000,000! The *Review* says, "The Americans are confident that they can carry and work at sea 15-inch guns, throwing 450 lb shot, with charges of powder sufficient to pierce and destroy a ship's side composed of 36 inches solid oak and 1 inch of iron lining, protected with 5½ inch plates. They have destroyed such a target at 100 yards distance, and they have done this with cast-iron guns and cast-iron shot. It will not do to shut our eyes to such eventualities. In designing these additional iron-clads, which it is too evident England will be compelled to build, the increasing difficulties of the question must be fairly considered and the magnitude of the cost boldly confronted." In our opinion such huge iron-clad war ships, now proposed for the British navy, might be very efficient at sea against inferior vessels; but in most cases they would be useless in America, for attacks on harbor fortifications or batteries, owing to their great draft of water—ranging from 28 to 30 feet. They would not be able to come within a range of ten miles from New York city.

REVELATIONS OF THE MICROSCOPE.

Brush a little of the fuzz from the wing of a dead butterfly, and let it fall upon a piece of glass. It will be seen on the glass as a fine golden dust. Slide the glass under the microscope, and each particle of the dust will reveal itself as a perfect symmetrical feather.

Give your arm a slight prick, so as to draw a small drop of blood; mix the blood with a drop of vinegar and water, and place it upon the glass slide under the microscope. You will discover that the red matter of the blood is formed of innumerable globules or disks, which, though so small as to be separately invisible to the naked eye, appear under the microscope each larger than a letter, o, of this print.

Take a drop of water from a stagnant pool, or ditch, or sluggish brook; dipping it from among the green vegetable matter on the surface. On holding the water to the light it will look a little milky; but on placing the smallest drop under the microscope, you will find it swarming with hundreds of strange animals that are swimming about in it with the greatest vivacity. These animalcules exist in such multitudes that any effort to conceive of their numbers bewilders the imagination.

This invisible universe of created beings is the most wonderful of all the revelations of the microscope. During the whole of man's existence on the earth, while he has been fighting, taming and studying the lower animals which were visible to his sight, he has been surrounded by these other multitudes of the earth's inhabitants without any suspicion of their existence! In endless variety of form and structure, they are bustling through their active lives—pursuing their prey—defending their persons—waging their wars—prosecuting their amours—multiplying their species—and ending their careers: countless hosts at each tick of the clock passing out of existence, and making way for new hosts that are following in endless succession. What other fields of creation may yet, by some inconceivable methods, be revealed to our knowledge?

THE SUN'S PATH AMONG THE STARS.

The sky, including the sun, moon and stars, rolls around us every day, from east to west. But the sun moves each day among the stars about one degree in the opposite direction; completing the circle of 360 degrees in 365 days. As the sun illuminates that half of the heavens in which it is situated at the time, it carries the day with it; slipping the illuminated half of the heavens slowly round from west to east. Hence the several stars rise about four minutes earlier each day than they did the day before; and, in the course of the year, they are each in turn brought up to our view during the night; excepting those that are so near the south pole of the heavens that they never rise.

The sun's path among the stars is not round the celestial equator or equinoctial, half way between the poles, but it crosses the equinoctial at an angle of 23° 28′; so that in midsummer the sun is among those stars which are 23° 28′ north of the equinoctial, and in midwinter he is among those stars which are 23° 28′ south of the equinoctial. An inspection of the simple apparatus described on page 402, Vol. VIII (new series) of the Scientific American will show how this change in the altitude of the sun varies the length of the days.

This motion of the sun was observed and the ecliptic was named long before the true cause of the phenomenon was suspected. It is now known to be produced by the annual revolution of the earth, in its orbit around the sun. The place of the ecliptic among the stars is always the same, while the places of the equinoctial and the poles are constantly but slowly changing.

POWER TO DRIVE CIRCULAR SAWS.

Differences of opinion prevail among millwrights respecting the amount of power employed to drive circular saws. Undoubtedly the power employed will just be in proportion to the work—the speed of the saw and the character of the lumber cut. The higher the speed and the harder the timber, the greater will be the amount of power required; but how much this is for saws of different sizes, according to their speed and the timber to be cut, is not very well known. Practice, and minute information furnished on these points, by those engaged in sawmills, would be very interesting to a large number of the readers of the Scientific American. On page 128, Vol. 14 (old series) of the Scientific American, it is stated that 12-horse power is required for a circular saw 52 inches in diameter, cutting yellow Southern pine, and running at the rate of 4,600 feet per minute, at the periphery.

A correspondent writing to us from Tioga, Pa., lately, states that 40-horse power is employed in that lumber region, for a 4-foot circular saw, and that this amount of power is for common, not extra work. We had entertained the idea, derived from persons engaged in sawing timber, that about 14-horse power was usually required to drive a 4-foot circular saw, in cutting such timber as white pine, spruce and soft maple; but this amount of power it seems would only be about one-third of that used in Tioga county, Pa.

A GOOD MACHINE OIL.

The difficulty of obtaining a good machine oil—apart from sperm which is too costly for general use—has been felt by manufacturers, and the evil deplored. Aside from the enormous friction entailed by bad lubricants, the absorption of power is a question of immediate loss, and one that soon makes itself apparent in the yearly bills for repairs. Mr. F. S. Pease, of Buffalo, N. Y., has experimented a long time on the production of a desirable machine oil, which could be afforded at a comparatively low rate; and has so far succeeded that, at the recent Exhibition of the World's Fair, held in London, he was awarded two medals upon its merits. The most eminent English engineers—one of them Mr. D. K. Clarke, professionally well known in this country—have testified to its excellent qualities; and Muspratt, the English chemist, thus states his opinion of it:—

"A qualitative examination of your engine and signal oil proves it to be of a compound nature. In my experiments it burned freely and gave a good light without clogging the wick. It is free from acidity and does not resinify when exposed in a thin stratum to the air. The preceding qualities indicate that the 'Engine and Signal Oil' is well suited to the use for which you have intended it."

Other certificates have been shown us—among them the endorsement of the United States Commissioner at the Industrial Exhibition: but we deem the above sufficient to establish the estimation in which the article is held abroad. Mr. Pease informs us that he has filled large orders for some English railways, and is now supplying the principal lines in this country. We have no hesitation in recommending the oil to manufacturers as a most desirable article.

RECENT AMERICAN PATENTS.

The following are some of the most important improvements for which Letters Patent were issued from the United States Patent Office last week. The claims may be found in the official list:—

Envelope Machine.—This invention relates to a movable slide placed under the lifters, in such a manner that a fresh supply of blanks can be introduced under the lifters at any moment whenever they begin to rise, without stopping the machine; also to a peculiar arrangement of the lifter and table which supports the gum box and under which the blanks are conveyed to the creasing box, in such a manner that the table itself pulls off the blanks from the lifters and retains them in a correct position for the plunger to act upon; and further, to certain improvements in the mechanism employed to impart the desired motion to the gum box in relation to the lifters, to counterbalance the conveyor, to crease, fold, and press the envelopes, and to discharge them from the machine when finished. George H. Reay, of New York city, is the inventor of this machine. The patent has been assigned in full to L. Negbaur, No. 5 Spruce street, New York.

Ring Spinning Frame.—In most if not all ring spinning frames heretofore constructed, the rings have been fitted snugly into openings provided for them in the ring rail, without any provision for adjusting them in the said rail. This rail is held in place by lifting rods which work up and down in stationary guides provided for them in the frame, and as these rods and guides wear, the rings become eccentric to the spindles, and cause great irregularity in the draft of the yarns in every revolution of the travelers and spindles, and make imperfect work. The object of this invention is to provide for the adjustment of the several rings in the rail separately, to set them concentric with their respective spindles; and to this end it consists in making the openings provided in the ring rail for the reception of the rings larger than the exteriors of the portions of the rings which are received within them, and in the employment of adjusting screws screwing into the rail from the inner and outer sides thereof, and into the said holes to adjust and hold the said rings therein. Welcome Jenckes, of Manchester, N. H., is the inventor of this improvement.

Leather-splitting Machine.—This invention consists, first, in the employment for adjusting the gage roller at the proper distance from the plane of the edge of the splitting knife according to the thickness to which the skin is to be reduced, of a pair of eccentrics or cams attached to the same shaft, and arranged to act one upon each of the journal boxes of the said roller, whereby the uniform adjustment of both ends of the said roller is insured, and the difficulty of adjusting the said roller correctly by separate adjustments, such as the screws commonly employed, at each end, is overcome. It also consists in making the standards or housings which contain the journal boxes of the gage roller adjustable, to bring the said roller more or less on the edge of the splitting knife, whereby the knife is enabled to be better secured against springing or accidental displacement, by obviating the necessity of adjusting it. Horace Wing,