long and twelve wide; to the sides or top of this affix slips of wood, raised about an inch or so above the level of the board throughout its entire length, within which the camera is made to slide. At the *lens* end of the latter is affixed a dark box of sufficient length and diameter, within which is made to slide an *inner* box about three or four inches long, with a groove at one end to receive the plateholder, which should be provided with frames to receive the plates of the required size. By this simple arrangement we are enabled to adjust the focus without much difficulty, and by sliding the negative plate nearer to, or further from, the lens, we get either an enlarged or diminished positive copy, as may be required. When required for use, a negative plate is placed in the holder, and the camera so placed that a *bright light* from the north or toward the zenith, is made to pass *through* the negative to the lens in the camera attached, by which is found an image on the ground glass. By a little care in focussing, we are now able to get a perfectly-defined image of the negative, when having introduced a stop with an aperature sufficiently small to produce the sharpest image to be obtained with sufficient illumination, the ground glass is replaced by the sensitised plate, which is exposed and developed in the usual manner. The image so obtained is a transparent *positive*. We now *repeat* the process, removing the original negative from the frame, which is replaced by the *transparent positive*, from which we obtain a printing negative of the required size. Negatives from which enlargements are required should be sharp and well defined, and as free from blemishes of all kinds as possible, as any defect in the original will, of course, become more apparent in the enlarged copy. The negative for enlarging is best if *unvarnished;* it should be soft and full of detail, as almost any amount of density may be produced in the copy by careful manipulation in the development and intensification. Transmitted positives may also be taken in direct sunlight, but in that case it must be *diffused* by first passing *through ground glass.* NOTE.—When copying paintings or engravings, it is best to focus with the *full* aperature of the lens that part of the picture which is about *one-fourth* of its diameter from the outer edge; a stop of the requisite size is then inserted, when the copy will be equally defined in all its parts.

HINTS ON LANDSCAPE PHOTOGRAPHY.—The best effects of light in a landscape are secured when white or light grey clouds are driving past the sun; these always give much reflected light, throwing detail and transparency into the deepest shadows. Brilliant effects may often be secured, when taking a view, by a *momentary* exposure during direct sunlight, without destroying the harmony of the picture. The principal object to be focussed should never be exactly in the *middle* of the picture, but more or less on one side. In the case of streets or avenues, these should pass up the picture obliquely; never in straight lines. The horizon should never cut the picture into two equal parts; in a level view, about one-third the hight of the picture may be allowed, and two-thirds when mountains and hills are in the background. As a rule it is best to keep the camera about as high as the head of the operator, especially when *water* is introduced in the view; for unless the lens is kept high enough to look *into it*, the reflection of surrounding objects will be lost.

HINTS ON PORTRAITURE.—When taking portraits care should be taken to cut off from the lens all light from extraneous objects. The best aspect for an operating room for portraiture is one facing the north or northeast. At one end the top and one side should be of glass; a little beyond this the sitter should be placed so that the vertical light is made to fall on an angle of about forty-five degrees; the face of the sitter should be turned toward the darkest side of the room. A screen covered with white paper or calico will be found useful, by shifting which as required the *depth* of the shadow on the side turned from the direct light may be regulated. The lens should be made to work with a moderately large aperature, if we obtain clear definition, by which greater relief and vigor is secured. The sitter should be so placed that all parts of the body are as nearly equi-distant from the lens as possible, as those parts nearest the lens always suffer a certain degree of enlargement and distortion. In portraiture it is almost necessary that we should work with a rapid lens to secure good impressions; and with a lens of moderately short focus we may expect to obtain more brilliancy from a less extent of hazy atmosphere, often interposed between it and the sitter. In regard to the best hight of the camera from the floor, it is recommended as a rule to bring the lens about opposite to the *chest of the model.* For giving perfect equality of definition this is somewhat too high; but on the other hand, if the lens were placed lower, the face would be rendered as if the observer were *looking up* at it; and a somewhat unnatural and unartistic view of the features obtained. When a plain background is used, it should be darker than the *lightest* shadows and lighter than the *darkest. Striking* accessories should be generally avoided, as they tend to distract attention from the principal figure and face, in which the chief interest should be concentrated.

DRESS.—For ladies, silks and satins of various shades, as reflecting much light, are to be preferred; dark woolen fabrics avoided. Open white lace upon a dark ground has a good effect, but *plain* white or light muslins should be avoided. When taking album portraits we should observe a *fixed* distance between the camera and the sitter, in all cases so arranged as to give a certain definite scale to the pictures, suggestive of truth as regards stature. If four-tenths of an inch is allowed in the picture for every *foot* in hight of a standing figure, it will be a good proportion; and if we cut the finished picture so as to leave about a fourth or three-eighths of an inch below the feet, the varying space above the head will give a tolerably just idea of the stature of the individual.

HARDENING SAWS AND OTHER ARTICLES.

Saws and springs are generally hardened in various compositions of oil, suet, wax and other ingredients, which, however, lose their hardening property after a few weeks' constant use: the saws are heated in long furnaces, and then immersed horizontally and edgeways in a long trough containing the composition; two troughs are commonly used, the one until it gets too warm, then the other for a period, and so on alternately. Part of the composition is wiped off the saws with a piece of leather, when they are removed from the trough, and then they are heated one by one over a clear coke fire, until the grease inflames; this is called "blazing off."

The composition used by an experienced sawmaker is two pounds of suet and a quarter of a pound of bees-wax to every gallon of whale-oil; these are boiled together, and will serve for thin works and most kinds of steel. The addition of black resin, to the extent of about one pound to the gallon, makes it serve for thicker pieces and for those it refused to harden before; but the resin should be added with judgment, or the works will become too hard and brittle. The composition is useless when it has been constantly employed for about a month; the period depends, however, on the extent to which it is used, and the trough should be thoroughly cleaned out before new mixture is placed in it.

The following recipe is recommended; twenty gallons of spermaceti oil; twenty pounds of beef suet is rendered; one gallon of neat's-foot oil; one pound of pitch; three pounds of black resin.

These last two articles must be previously melted together, and then added to the other ingredients; when the whole must be heated in a proper iron vessel, with a close cover fitted to it, until the moisture is entirely evaporated, and the composition will take fire on a flaming body being presented to its surface, but which must be instantly extinguished again by putting on the cover of the vessel.

When the saws are wanted to be rather hard, but little of the grease is burned off; when a milder, a larger portion; and for a spring temper, the whole is allowed to burn away. When the work is thick, or irregularly thick and thin, as in some springs, a second and a third dose is burned off, to insure equality of temper at all parts alike.

Gun-lock springs are sometimes literally fried in oil for a considerable time over a fire in an iron tray; the thick parts are then sure to be sufficiently reduced, and the thin parts do not become the more softened from the continuance of the blazing heat.

Springs and saws appear to lose their elasticity, after hardening and tempering, from the reduction and friction they undergo in grinding and polishing. Toward the conclusion of the manufacture, the elasticity of the saw is restored principally by hammering, and partly by heating it over a clear coke fire to a straw color: the tint is removed by very diluted muriatic acid, after which the saws are well washed in plain water and dried.

Watch springs are hammered out of round steel wire, of suitable diameter, until they fill the gage for width, which at the same time insures equality of thickness; the holes are punched in their extremities, and they are trimmed on the edge with a smooth file; the springs are then tied up with the binding-wire, in a loose open coil, and heated over a charcoal fire upon a perforated revolving plate; they are hardened in oil, and blazed off.

The spring is now distended in a long metal frame, similar to that used for a saw blade, and ground and polished with emery and oil, between lead blocks; by this time its elasticity appears quite lost, and may be bent in any direction; its elasticity is, however, entirely restored by a subsequent hammering on a very bright anvil, which "puts the nature into the spring."

The coloring is done over a flat plate of iron, or hood, under which a little spirit-lamp is kept burning; the spring is continually drawn backward and forward, about two or three inches at a time, until it assumes the orange or deep blue tint throughout, according to the taste of the purchaser; by many the coloring is considered to be a matter of ornament, and not essential. The first process is to coil the spring into the spiral form, that it may enter the barrel in which it is to be contained; this is done by a tool with a small axis and winch handle, and does not require heat.

The balance-springs of marine chronometers, which are in the form of a screw, are wound into the square thread of a screw of the appropriate diameter and coarseness; the two ends of the spring are retained by side-screws, and the whole is carefully enveloped in platinum-foil, and tightly bound with wire. The mass is next heated in a piece of gun barrel closed at the one end, and plunged into oil, which hardens the spring almost without discoloring it, owing to the exclusion of the air by the close platinum covering, which is now removed, and the spring is let down to the blue, before removal from the screwed block.

The balance or hair-springs of common watches are frequently left soft; those of the best watches are hardened in the coil upon a plain cylinder, and are then curled into the spiral form between the edge of a blunt knife and the thumb, the same as in curling up a narrow ribbon of paper, or the filaments of an ostrich feather.

In hardening them they are heated by being drawn backward and forward through an ordinary forge fire, built hollow, and they are immersed in a trough of plain water; in tempering them they are heated until the black red is just visible at night; by daylight the heat is denoted by its making a piece of wood sparkle when rubbed on the spring, which is then allowed to cool in the air. The metal is nine-sixteenths of an inch thick, and some consider five-eighths the limits to which steel will harden properly, that is sufficiently alike to serve as a spring; their elasticity is tested far beyond their intended range.

Great diversity of opinion exists respecting the causes of elasticity in springs; by some it is referred to different states of electricity; by others the elasticity is considered to reside in the thin blue, oxidized surface, the removal of which is thought to destroy the elasticity, much in the same manner that the elasticity of a cane is greatly lost by stripping off its silicious rind. The elasticity of a thick spring is certainly much impaired by grinding off a small quantity of its exterior metal, which is harder than the inner portion; and perhaps thin springs sustain in the polishing a proportional loss, which is to them equally fatal.

It has been stated that the bare removal of the blue tint from a pendulum spring, by its immersion in weak acid, caused the chronometer to lose nearly one minute each hour; a second and equal immer-

sion scarcely caused any further loss. It is supposed springs get stronger, in a minute degree, during the first two or three years they are in use, from some atmospheric change; when the springs are coated with gold by the electrotype process, no such change is observable, and the covering, although perfect, may be so thin as not to compensate for the loss of the blue oxidized surface.—*Metal-Worker's Assistant.*

DR. VŒLCKER ON DISINFECTANTS.

Dr. Vœlcker recently delivered a practical lecture to the members of the Royal Agricultural Society on the subject of disinfectants, of which we reprint a portion.

The professor stated that microscopic researches have proved that the contagious matter of cattle plague consists of minute and peculiar organic cells moving about rapidly, that these cells were found in the dung of diseased animals, and, it was believed, might be given off by lungs and skin, and thus, either from the droppings, or floating about in the atmosphere, and capable of being wafted some distance, were introduced into the blood of animals brought within range of their baneful influence. He divided the subject under three heads—viz.: 1. Various disinfectants recommended, their mode of action, and efficiency. 2. Application of same for particular purposes. 3. Means of prevention. He first explained the nature of a true disinfectant, and how incorrectly the term was often applied to agents that acted in a totally different manner. The term disinfectant should only be applied to those matters that can actually destroy the contagious matter, whereas it was often applied to substances which neutralize or destroy gaseous products of decomposition; thus, sulphate of iron removes sulphureted hydrogen from the air without destroying the animal matters, which, on decomposition, evolve this gas; whereas chlorine and nitrous acid completely break up or destroy decomposing matters, converting them into their ultimate gaseous products, which are comparatively harmless. The latter are true disinfectants, as well as deodorizers. Again, substances which retard or prevent putrefaction are antiseptics; thus, weak solutions of carbolic acid do not destroy, but arrest putrefaction.

As true disinfectants we may class chloride of lime, chlorine gas, sulphurous acid, nitrous and nitric acid, charcoal, quicklime, caustic alkalies, earth, manganates and permanganates, and the action of fire.

Chloride of lime, which is, perhaps, the most useful of the above, acts by yielding up oxygen, which destroys organic matters; 1 pound of chloride of lime to 3 gallons of water forms a proper solution for applying to droppings of cattle, washing down floors, walls, etc.; while 2 ounces of the same, with 1 gallon of water, is a suitable mixture for washing our hands, or sprinkling on the clothes of those engaged in attending on diseased animals.

Chlorine gas and sulphurous acid fumes are useful for disinfecting buildings. The latter is the easiest to apply, as the combustion of ½ pound of flour of sulphur, in three or four little heaps on the floor, will produce abundance of sulphurous acid.

Nitric acid for the same purpose, obtained by mixing 4 ounces powdered niter, 4 ounces oil of vitriol, and 2 ounces water in an earthen vessel, and heating over a brazier.

Nitrous acid is made by pouring ½ pound of oil of vitriol on 2 or 3 ounces of copper shavings. All these produce disinfecting fumes.

Wood and peat charcoal are powerful disinfectants, as the condensed oxygen in the cells hastens decomposition and eats up organic matter, fresh supplies of oxygen being absorbed from the atmosphere and condensed; and thus the process continues. A small quantity of peat charcoal will destroy a large quantity of animal matter. This substance is very good to cover carcasses that are buried.

Porous earth acts as a true disinfectant.

Caustic soda and soda ash: the latter is better than lime, as it dissolves in water, readily enters porous materials, and removes impurities from the surface.

Condy's Fluid, a solution of manganate and permanganate of potash, is a good disinfectant, freely supplying oxygen; but it is not practically available by farmers. Fire and high-pressure steam destroy infectious poisons.

As simple deodorizers Dr. Vœlcker merely mentions perchloride of iron, in solution of 1 to 10 of water; sulphate of iron (green vitriol); sulphate and chloride of zinc, and nitrate of lead, in the same solution.

As antiseptics we have creosote and carbolic acid, derived from distillation of coal, and which is the most powerful and cheapest antiseptic that we have. This substance enters largely into the composition of a number of materials, as McDougall's Disinfectant, Cliff's Antiseptic Fluid, etc., which are just now offered to the public. Dr. Vœlcker next considers the application of disinfectants, according to the particular object: 1. For treating animal carcasses. 2. Disinfecting cowsheds, etc., where disease has been. 3. Manure. 4. Pastures. 5. Cattle trucks, barrows, stable tools, clothes, etc.

The manure may be sprinkled with solution of chlorate of lime before moving, then a good layer of quicklime when put in the barrow, and taken to a field, and made into a heap, consisting of alternate layers of soil, manure and lime; 5 cwt. of lime to each tun of manure. At the end of three months the heap may be turned and ingredients mixed, and after lying another month, Dr. Vœlcker considers it might be safely used.

The pastures which diseased cattle have inhabited should be left without stocking for some months, the clots knocked about, and 100 bushels per acre of quicklime applied.

Trucks, barrows, etc., cleaned thoroughly with soft soap and water, and then washed with a solution of chloride of lime.

Laborers and inspectors must also be disinfected—the latter, it was suggested, might keep at each farm, where animals were diseased, a pair of pattens, and stump about the sheds in these. The boots of attendants should be most carefully washed in the caustic soda, or else the men made to pass over a layer of fresh lime, and it strikes us as an excellent plan if the entrance to the sheds and premises generally were daily strewn with a layer of quicklime.

Lastly, the question of prevention was slightly touched upon, rather to point out how very little we really knew about antiseptics, and how desirable some thoroughly exhaustive experiments would prove than to suggest anything. Perfect isolation was pointed out as all important; then the distinction of contagious matter. The use of carbolic acid in weak solution (1 to 100) to wash over the animal's body and sprinkle about, might, probably, be a wise precautionary measure, and could do no harm.

The most noticeable remarks in the discussion that followed were those of Colonel Talbot, who related his experience in a dairy of over one hundred cows, at Sudbury, about six miles from London, which, till within a week, had escaped the plague. He had employed Burnett's Fluid (chloride of zinc) to sprinkle about, and wash the animal's body, and had also given internally charcoal daily and niter occasionally. Whether this treatment has been of any use he could not say, but up to the time stated no disease appeared. His treatment of the disease, which he could not trace to any contagion, was as follows:—First, if the bowels were constipated, a mild aperient should be given, consisting of one and a half pounds of treacle, two or three ounces of salts, two table spoonsful of sulphur, and a bottle of Day's Fluid; after some hours, a dose of warbena—a patent medicine of Dr. Collis Browne's, much resembling chlorodyne. If not cured in two days, he tried hydropathy, as recommended by Mr. Graham, of Capheleie; and if this was unsuccessful, he applied external stimulants to the region of the abdomen. According to Col. Talbot's account, the effects of the warbena had been most remarkable, as, although the disease only first appeared a week or ten days ago, several animals were considered to be recovered, and one was giving nineteen quarts of milk daily.—*London Field.*

A DENTIST published an article in the *Dental Register* for December, 1865, on the steam gage, wherein it was stated that at a heat of 320° the pressure was 30 pounds per square inch. Some error occurs here, for the pressure of steam at 320° is 75 pounds per square inch by Regnault's scale and Fah. thermometer.

NEW INVENTIONS.

Combined Watch Key, Toothpick and Toggle; and Combined Watch Key and Toggle.—Two articles of jewelry with the above titles form the subject of two letters patent issued on the 20th inst. to Richard Cross, manufacturing jeweller, 54 Friendship street, Providence, R. I. Both articles are neat, ornamental, and useful. The one combines, in one article, a toggle for preventing the watch chain from slipping through the button-hole of a gentleman's vest, a watch key, and a gold toothpick—the latter being concealed in the toggle so as to prevent it from being injured; the other combines in one article a toggle and a watch key; and in this case the toggle may be of the usual or any appropriate style externally, the key being arranged to fit inside the toggle, so as always to be protected against dirt, etc., getting into the keyhole, and the key may be detached from the toggle for winding the watch, which can be done more easily than where the key is attached to a bunch of keys, or the like. Both articles are ornamental, and the several functions which each will perform recommend the articles for general use.

Pump for Oil and Other Wells.—The object of this invention is to produce a pump which can be used under the liquid to be raised, and which can be worked effectually at great depths. A vacuum is formed, both at the top and the bottom of the cylinder, without the use of the ordinary articles outside water ways, a valve chamber being formed in the top of the cylinders, and the sides of the cylinder being perforated with numerous holes to admit the liquid to the valve. H. A. M. Harris, of Philadelphia, Pa., is the inventor.

Stereoscopic Instrument—The object of this invention is to so construct or arrange a stereoscopic instrument that when not used it can be folded up in a compact and convenient shape for being carried about the person, and when unfolded for use the picture-holder can be readily adjusted to the proper focus corresponding to the eyes of different persons; and it consists in attaching the head-piece of the instrument, or that in which the lenses are hung to any suitable bed plate, in such a manner that when the instrument is not in use it can be swung down and upon the same, together with so attaching the diaphragm or partition plate for the two lenses of the instrument, to confine the vision of each eye to its appropriate picture, to the said bed plate that it can be folded down and upon the same, while, at the same time, when the instrument is to be used, by swinging the said diaphragm up and into its proper place, the holder for the lenses is securely held in an upright position thereby; the frame in which the picture is placed being arranged upon the bed plate of the instrument in such a manner that it can be moved either toward or away from its lenses, and thus adjusted to the sight of the person using the instrument. Antonio Quirolo, of 337 Broadway, New York City, is the inventor.

Horse Hay Fork.—This invention relates to a new and improved implement for unloading hay and depositing it in barns by means of a horse, and which are commonly termed horse hay forks. The object of the invention is to obtain an implement for the purpose specified which may be constructed at a very moderate expense, be capable of being manipulated with the greatest facility, and not liable to be impeded or interfered with in its operation by obstructions in a barn, such as beams, braces, etc., of the framing, and which may be tripped to discharge its load at any point in the path of its upward movement, however much it may turn while being hoisted or elevated, and whatever position the tripping latch may have relatively with the operator. B. F. Hisert, of Norton Hill, N. Y., is the inventor.

Machine for Cutting Barrel Heads—This invention consists of a circular concave or disk-shaped saw and cutter head, placed on an adjustable arbor, in connection with an adjustable or swinging rotating clamp, all arranged to operate in such a manner that barrel heads of different sizes or diameters may be sawed with one and the same machine and the work done very expeditiously and in a perfect manner. John S. Thompson, Glen Falls, N. Y. is the inventor.

How is the red color given to watch hands? Can any reader inform us?