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THE SCIENTIFIC AMERICAN SUPPLEMENT

No. 452,

For the Week ending August 30, 1884.

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BALANCING WHEELS AND CYLINDERS.

For wheels of large diameters and wheels and cylinders of great velocity, accurate balancing is required. It is not yet determined that a standing balance and a running balance can be made identical, especially when a belt is used, as on the flywheel of an engine, or the momentum of a crank is to be overcome. But for many purposes the standing balance is near enough to accuracy to prevent tremor and injurious jar in running. When the wheel can be turned inside as well as outside, the rim balancing is not always necessary if the arms approach uniformity in size; but there are cases where inside turning is impossible, and balancing becomes a necessity.

There are three methods of balancing in use, the most common being the suspension of the cylinder or wheel on the centers of an arbor or shaft. This is not always accurate, as, if the wheel is very heavy, the centers must be set up too hard to allow the wheel or cylinder to turn easily.

A better way is to suspend the wheel by the journals on which it is to run; but if these are seated in boxes, the same objection will exist. To obviate this, the journals are sometimes mounted on friction rollers; but a much more accurate method is to mount them on two parallel bars, planed and filed to exactness and fixed perfectly level. These are long enough to allow the journals to travel far enough to make a complete revolution of the wheel or cylinder shaft, 3 inches diameter requiring bars something over 9 inches long. By this method the degree of accuracy obtained is very great, as the journals bear on the bar at only one point, and the mass rolls at a touch.

There is still another method, especially applicable to large turned wheels, as the fly wheels of steam engines. In this the wheel, after being bored and turned, is suspended by the central hole so that the wheel hangs horizontally. The wheel is held by an eye bolt accurately turned, having mounted on it two disks with shoulders turned to fit the bore of the wheel; thus the eye of the bolt is in the mathematical center of the wheel. The wheel is then suspended by a crane, and a spirit level laid on the turned edge of the rim. If the wheel hangs true, the level will show no declination; but the slightest variation of weight will deflect the rim. Pieces of iron are hand clamped on the opposite side, and when accuracy is attained the clamp and weight are weighed, and a pattern for a casting to go inside the rim is made accordingly.

Coloring of Brass.

We translate the following from *Industrie Zeitung:*

If brass be covered with moistened sand for some time a beautiful brown coloration is developed upon the surface, which remains bright when polished with a dry brush. In order to render the color more light or green, it is covered with a film of verdigris obtained by evaporation of dilute acid applied to the surface. The antique appearance of the article thus treated is quite beautiful and more or less lasting. An objectionable feature of the process is the extent of time necessary for its execution, and it has for this reason been substituted by another process.

The brass being heated is immersed in old or dilute nitric acid, and left therein till the surface is covered with scales; it is then cleansed with sand, washed, and bronzed. The term bronze comprehends in commerce all possible colorations.

Brown is obtained by immersion in a solution of nitrate or chloride of iron; the intensity of the color being dependent on the strength of the liquid—for violet colors antimony chloride being used; while a chocolate color is obtained when the surface is covered with a layer of humid iron oxide and highly heated, and polished with graphite. By moistening the brass with a solution containing iron and arsenic chloride, an olive-green is imparted to it. The liquid is prepared by dissolving the respective metals in muriatic acid. The surface is polished with a graphite brush and coated with a lacquer composed of 1 part varnish, 4 parts turmeric, and 1 part gummi gutta.

A steel color is developed by using a boiling solution of arsenicchloride, while a careful application of a concentrated solution of sodium sulphide causes a blue coloration.

Black, being generally used for optical instruments, is obtained from a solution of gold or platinum chloride, to each of which tin nitrate has been added. In Japan the brass is bronzed by using a boiling solution of copper sulphate, alum, and verdigris.

The success in the art of bronzing depends in a chief measure upon the temperature of the alloy and solution, the quality and proportion of the metals used in preparing the alloy, length of time of immersion, drying, and many other particularities—as regards care of the manipulations—which demand a dexterity only acquired by practice.

When it is not the object to impart to the surface an artificial color, but to protect it against the formation of rust or oxidation, a coating of the surface with a varnish called "lacquer" will then suffice. The metal is heated as above, steeped in acid, and washed with water; it is again immersed in pure nitric acid, washed, and dried in sawdust. Or the brass is placed in dilute nitric acid—1 part of acid to 1 part of water—until the surface appears quite white, being then washed and dried as before. The first method produces a bright, the latter a dull surface; by polishing the projecting parts this imperfection is partly overcome. The articles are again immersed in acid, washed with water, containing some crude potassium bitartrate, and dried in hot sawdust. The so prepared articles are heated on a hot plate and then varnished. The varnish used is prepared by dissolving 1 ounce shellac in 1 pint alcohol. Pigments, sandalwood dragon's blood, and annatto are introduced to increase the color and gloss; also turmeric, saffron, gummi gutta, etc. The former produce a yellow, these a red, and a mixture of both a beautiful orange colored varnish.

An excellent light colored lacquer consists of 3 parts aloes, 1 part turmeric, and 1 part plain varnish. A yellow lacquer is composed of 1 part turmeric, 4 parts dragon's blood, and 1 part of the spirit varnish. A red lacquer can be made by mixing 32 parts of annatto, 8 parts dragon's blood, and 1 part varnish.

Lacquers fade and are chemically altered by the combined action of light and heat, and should be kept in vessels of glass or earthen ware; they are also affected by metals.

The Microscope in Analysis.

The recent gift by Andrew Carnegie of $50,000 to Bellevue Hospital, New York city, to be devoted to the furtherance of microscopic study and microscopic investigation, is a step which must go far toward adding to the value of the microscope as an aid to the chemist as well as to the physician and surgeon.

With every improvement in that noble instrument, the telescope, new worlds are revealed to the astronomer, and the science of astronomy owes as much to the skill of Alvan Clark, the instrument maker of Cambridge, as to the patience and learning of Secchi or of Proctor or Langley. So it is in respect to the microscope, and the skillful and ingenious men who are continually improving and perfecting these invaluable instruments. The modern analytical chemist finds a microscope almost as indispensable in his researches, especially in organic analysis, as are his retorts and acids and tubes.

The intricate relation which botany bears to medicine presents a field in which intelligent use of the microscope must produce excellent results. The student of medicine is to-day enabled to unravel, before the potent glance of the perfected microscope, the deepest mysteries of the medicinal plant, flower, herb, or root. The nature, virtues, attributes, etc., of these can be studied at leisure, and gazed upon with an eye that magnifies from a few hundred to thousands of diameters.

The brilliant discoveries by Pasteur and by Koch are as much due to the perfected microscope as to any one cause. The nature and habits of the tubercular bacillus have only been capable of study since the microscope was so improved that organisms heretofore unrecognizable stand revealed. Disease has been traced to its source, the presence of bacteria and germs, by the use of the finest microscopic appliances; and in fact a thorough course study in the art of intelligently using this instrument is becoming yearly a greater necessity, not only to the medical student but the pharmacist who wishes to keep abreast of the age we live in. The relation of the microscope to cholera is at present an interesting and close one. And when another potent servant of man, electricity, is summoned to aid the microscope, the power of the latter is increased to an astonishing degree. Recently in London such an apparatus threw upon a screen the image of a cholera germ, magnified two million times, and in which these long hidden and minute organisms appeared the size of the human hand.

The motto of the modern microscopist seems to be: "There is nothing hidden that shall not be revealed." And the determination of the modern student of medicine and of drugs and their effect and nature should lead him to expend less upon cigars and divers luxuries and aim to be the possessor of an instrument without which three-fourths of the realm he proposes to enter will remain invisible. Fortunately, the growing perfection of the instrument does not imply increased cost. And it is now possible to secure a microscope of marvelous power for a sum which a decade ago would by no means have secured a much less perfect instrument.

We are satisfied, concludes the *Independent Record*, of this city, that in the next few years the microscope, in the hands of brainy and quick witted American students, must pave the way for discoveries in the realm of medicine that will be worthy of a place beside those of Pasteur or of Koch.

A New Revenue Cutter.

The Commodore Perry, a United States revenue cutter, just completed by the Union Dry Dock Co., of Buffalo, for service on the great lakes, is an iron steamer of 451 tons displacement. Her length over all is 161 feet, on the water line 145 feet, beam 25 feet, depth 11 feet 2 inches, draught of water 9 feet. Her rig is that of a topsail schooner. Her engines and boiler were constructed by the Hartford Engineering Co. The boiler is a return tubular, 15 feet long and 11 feet 6 inches diameter of shell. She has a single direct acting engine, cylinder 38 inches diameter and 40 inch stroke, single screw propeller 10 feet in diameter and of 4 blades. Her decks and spars are of white pine. All hands from the captain down are quartered below the main deck; the captain's cabin is in the extreme stern next the ward room. The engine and boiler are amidships, and the men forward.

The woods used for finishing are white pine, black walnut, mahogany, cherry, and ash. She is a neat, handsome little steamer, inside and out, in every way creditable to the builders. An excellent drawing of the vessel has been made by Mr. Frank R. Rosseel, of Buffalo.