

Japanese Process of Varnishing.

In 1873 Professor Rein, of Marburg, was sent by the Prussian Minister of Finance and Commerce to Japan, to study those branches of industry in which that people excel, and thoroughly examine processes of manufacture. Upon his return he gave a course of instruction in varnishing, or japanning, to an employee of Messrs. Beuttenmueller & Co., from whose report to the Baden Minister of Commerce we abstract the following:

The course of lessons given by Dr. Rein lasted 9 hours a day for 6 days. Dr. Rein filled up the intervals, while waiting for the work to dry, with theoretical instructions about the plants from which the varnishes are prepared, the method of preparing the different qualities, etc.

Japanese varnish is obtained from a tree, *rhus vernicifera*. This varnish tree, which is called *urushi naki* by the Japanese, reaches a height of 33 feet; and at the age of 40 years, the trunk is 40 inches in circumference, grows very slowly, about 13 inches per year in height. The wood is strong and heavy, has few branches, consequently very little foliage, and the tree is not very pleasing to the eye. The fruit resembles grapes, and grows in thick spikes on the branches. In October the fruit is ripe, and is collected in November to obtain from it a vegetable wax, known as Japanese wax. The tree is best propagated from the root shoots. It reaches its greatest perfection at its 18th year, and then produces the largest yield of lac or varnish. This is obtained by slitting the bark in a horizontal direction, and may be performed at any time between April and October; later in the year the lac is very thick and viscid, so that its collection is attended with much greater difficulty. The lac tapper carries his own peculiar bow-shaped knife, made for this purpose, with which he cuts a 2 millimeter ($\frac{1}{16}$ inch) cut in the trunk of the tree in a horizontal direction, and then draws the point of the knife through the cut again, to remove any chips formed by the first cut. This cut is made low down; on the opposite side of the trunk 15 or 20 cm. (6 or 8 inches) farther up, a second cut is made, then on this side again, and so on until the trunk has 6 or 10 such cuts. After he has cut 10 or 15 trees, he returns to the first tree and collects the sap oozing from the cuts, which sap is light gray, and thick; but by exposure to the air, it at once turns dark brown and afterwards quite black. The crude lac is called *ki-urushi*.

The tree is hacked in this way for 60 to 80 days, until it dies; it is then cut down, the wood chopped up and put in hot water, which extracts the last remnant of the sap. From the tree when cut down, $\frac{1}{2}$ liter at most of sap is obtained, and this forms the poorest kind of lac. The value of 100 lac trees is about \$30 to \$40.

The lac is purified in the following manner: It is first filtered through cotton stuff, ground on a paint stone like ordinary paints, mixed with water, and the water evaporated again by warming. The finer sorts are bleached in shallow dishes in the sun. The best kind is called *nashyi-urushi*, the poorer kind *henki-urushi*, the unbleached *jeshime-urushi*. The black varnish, *roiro-urushi*, is made from the crude lac, *ki-urushi*. There are about 20 different kinds in market, of which the above named are most used. The cost in Japan is: *Nashyi-urushi*, \$4.77 per lb.; *jeshime-urushi*, \$1.65 per lb.; *roiro-urushi*, \$3.70 per lb. The Japanese varnishes are as often adulterated in trade as wine in Germany (or milk with us)?

The operation of varnishing is conducted totally different from what it is in Europe. The Japanese apply their varnishes mostly to woodwork, less frequently to copper and unglazed stoneware and porcelain. When applied directly to tinware, the japan does not stick. The varnishes, when applied, are generally brilliant black, dark colored, impure vermilion, or impure dark green, or dark gray. Pure light colors and white cannot be produced with Japan varnish.

The Japanese varnishers prepare their woodenware with the utmost care, the surfaces are smoothed and the chinks filled with cement. The ground coat is a mixture of *jeshime-urushi* with paste; upon this is laid Japanese paper, rubbed smooth with a brush, and dried. Afterwards several very thin coats of the same varnish, now and then well dried, and, after every coat, polished with Japanese carbon.

The drying is performed in a moist atmosphere. For this purpose they take a box that will shut tightly, put the articles to be dried in it, close the box and wet it on all sides with water. After 24 hours one coat is dried. If the articles are to be black, it is now given a coat of black varnish, *roiro-urushi*, but if it is to be gray or gray-brown, *jeshime-urushi* is used instead, and if it is to be red, the latter varnish is mixed with vermilion. The appearances of gold and pearl are obtained by mixing real gold dust, or mother of pearl dust, with the varnish, whereby a beautiful effect is produced. It is then dried, rubbed down, and polished; and if there are gold, tortoiseshell, or mother of pearl decorations, another coat of azure varnish, *nashyi-urushi*, is applied. Dr. Rein communicated other methods of japanning, the introduction of which, in this place, would lead us too far.

In applying their varnishes, the Japanese use broad brushes, the bristles of which are very stiff, and inserted in wood, just as the graphite is in our lead pencils. After long use the bristles get worn short, and the wood is cut away as in sharpening a pencil, exposing more of the bristles. A very fine piece of work receives 18 coats; these never fade with time but rather improve, bear a high heat, and are totally unaffected by acids, spirits, and the like.

The Japanese method is not likely to be introduced into

Europe or this country, because of the want of the natural material, which, when imported from there, becomes extremely costly; and the process is indirect and tedious, and, with the high price of wages, would be impracticable.

The Great Wall of China.

The Great Wall of China was measured in many places by Mr. Unthank, an American engineer, lately engaged on a survey for a Chinese railway. His measurements give the height at eighteen feet, and a width on top of fifteen feet. Every few hundred yards there is a tower twenty-four feet square, and from twenty to twenty-five feet high. The foundation of the wall is of solid granite. Mr. Unthank brought with him a brick from the wall, which is supposed to have been made two hundred years before the time of Christ. In building this immense stone fence to keep out the Tartars, the builders never attempted to avoid mountains or chasms to save expense. For 1,300 miles the wall goes over plain and mountain, and every foot of the foundation is in solid granite, and the rest of the structure solid masonry. In some places the wall is built smooth up against the bank, or canons, or precipices, where there is a sheer descent of 1,000 feet. Small streams are arched over, but on the larger streams the wall runs to the water's edge, and a tower is built on each side. On the top of the wall there are breastworks, or defences, facing in and out, so the defending forces can pass from one tower to another without being exposed to any enemy from either side. To calculate the time of building, or cost of this wall, is beyond human skill. So far as the magnitude of the work is concerned, it surpasses everything in ancient or modern times of which there is any trace. The Pyramids of Egypt are nothing compared to it.—*London News*.

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NEW MECHANICAL AND ENGINEERING INVENTIONS.**IMPROVED MILLER'S PAINT STAFF.**

Jacob Anstine, Huntsville, O.—This is an improved form of miller's paint staff, or device for applying a color in a true plane to the face of a millstone to detect and locate the high places when the stone is "in wind," or has uneven places, and then permit the same to be trued up. It consists in a staff made in the form of an equilateral triangle, the advantages being partly in the facility and accuracy of construction (the same measurement of bar serving for all three sides), but more especially in the corrections of its results, the equilateral triangle being best adapted to the circular area of a millstone.

IMPROVED CAR WHEEL.

William Y. Cruikshank, Shamokin, Pa., assignor to John Cruikshank, of same place.—This invention consists of an oil chamber arranged in the hub of the car wheel, and connected by radial holes to an annular recess in bore of wheel or groove of axle. Ribs or elevations of the oil chamber arrest the oil, and feed it to the supply holes to lubricate the bearings, and pass the surplus back again to the oil chamber. The centrifugal force distributes the oil during the running or revolving of the wheel by the aid of the outer elevations around the outer surface of the oil chamber, while the side elevations conduct the oil and cause it to flow through the holes to the axles. When the wheel ceases to revolve the oil above the axle is guided along the ribs to the holes, and along or around the axle or shaft in the recess or groove back to the holes below the axle, and thence into the oil chamber again, saving thus all the oil which is not used actually in lubricating the axle or shaft. Sufficient oil adheres to the axle to run the wheel in either direction and lubricate the bearings.

IMPROVED DRY WOOD GRINDER FOR PAPER-PULP.

Isaac W. Bowers and David A. Curtis, Petersburg, Mich.—This invention relates to an improved machine for making dry pulp from dry wood in a cheap and simple manner, which pulp has the advantage of being readily shipped, not liable to freeze, and being converted with less labor into paper. The invention consists of a machine for grinding up the wood by exposing it to the action of a cylinder covered with a grinding surface of glue, ground flint, quartz, and emery, and conveying the pulp by a hopper and an endless revolving belt to a reciprocating screen. The wood pulp produced by a dry process with this machine is, in many respects, superior to that obtained by the wet processes hitherto in use, as it does not mold or freeze, and may be more conveniently shipped. The machine is cheaper and simpler in construction than those used in wet processes, and may be run without skilled workmen. A number of machines may be arranged side by side, according to the quantities of pulp to be manufactured.

IMPROVED AUTOMATIC CYLINDER COCK.

Joseph M. Graham, Bloomfield, assignor to himself and George Elliott Bedford, Ind.—This invention relates to cocks for discharging the water of condensation from engine cylinders, and it consists in the arrangement at each end of the cylinder, of cups of sufficient capacity to contain water accumulating during one stroke, and in small valves placed in the said cups that open upward and are connected with a lever which is held by a spring, so that the valves are both open when the pressure is removed, but admits of the valves being alternately closed by the steam pressure as it acts in the cylinder. As steam is admitted to the cylinder it closes one of the valves while the other remains open, and when steam is admitted to the opposite end of the cylinder, the valve which before was open is closed by steam pressure, and by virtue of the connection of the two valves with the lever, the valve which was closed is now opened, permitting the escape of the water from the cavity. The valves are automatic in their action, and the water escapes when the pressure is removed, so that the noise of escaping steam common to other devices for relieving engine cylinders of water is by this improvement entirely avoided, and the valves need no attention.

IMPROVED TREADLE MOTION.

Henry B. Barber and Clark J. Barber, Scott, N. Y.—The object of this invention is to furnish an improved treadle motion for sewing machines, lathes, and other like machines, by which the working of the machines is

facilitated and produced with less effort of the foot; and the invention consists of the combination of the swinging treadle with a pitman of inverted V-shape, which is pivoted to the toe of the treadle and the supporting rod of the same, and at the apex or upper end of the crank rod of the flywheel. The elbow formed between the pitman and crank transmits the power in more effective manner to the flywheel, requiring less effort to run the machine, and rendering thereby the working of the same less fatiguing and trying.

IMPROVED FREIGHT CHUTE.

William C. Crompton, New York city, James Nicol, Newark, and Richard Hawley, Jr., Jersey City, N. J.—The object of this invention is to furnish a chute for lowering cheese and other freight in loading vessels, in warehouses, and in other places, in such a way that it will not be injured, and which shall be simple in construction and convenient and reliable in use. To the sides of the chute are attached guide bars which project inward and incline downward. The guide bars are made elastic, or have spiral or other springs placed between them and the sides of the chute, so that they may yield to allow the articles to pass, while at the same time they offer sufficient resistance to said articles to check or retard their descent, and prevent their acquiring too great a velocity and momentum.

IMPROVED ACCOMMODATING PULLEY FOR CABLES USED IN PROPELLING CARS, ETC.

Orlando H. Jadwin, Brooklyn, N. Y.—The object of this invention is to provide an effective means for the propulsion of cars, boats, or other bodies, and it consists, first, in the manner of connecting and disconnecting the car from the travelling cable; and, second, in the manner of supporting the cable on accommodating pulleys which allow a knot, swivel, or other bulky obstruction to ride over with ease. The connection between the car and traveling cable is so made that the cable is not pinched, but simply has its tension increased, so that neither car nor cable receives any sudden jar, as the motion of the cable slipping through imparts the motion gradually until the car has attained nearly the same speed as the cable, at which time the tension is made sufficiently tight to prevent slipping between the friction and tension rollers.

IMPROVED APPARATUS FOR OPERATING PUMPS.

John A. Hurley and Daniel J. Hurley, Oil City, Pa.—This invention relates to an improved pumping apparatus for oil and artesian wells, and consists of a rock beam operated by the pitman of an engine, and connected by ball joints with the ends of a cable or rope, passing over guide pulleys, and being attached by an adjusting device on the pump rod. The rock beam is connected at the lower end with the pitman of a steam or other engine, by which oscillating motion is imparted to the rock beam, which, by the cable and adjuster, gives vertical reciprocating motion to the pump rod, so as to work the well by a simple and reliable apparatus.

NEW MISCELLANEOUS INVENTIONS.**IMPROVED PANTOGRAPH.**

Elijah Ware, Omaha, Neb.—The object of this invention is to provide a simple and inexpensive pantograph which may be adapted to large or small work, as may be required; and it consists of a pantograph of rectangular form, made of four bars, so placed as to assume a parallelogram. To one end of this parallelogram are pivoted, or attached by means of screws, three supplementary bars, two of which continue the parallelogram form of the instrument, while the third bar makes the end piece. These last named bars are used for copying, enlarging, or reducing large work. The size of the copy is varied by shifting the last named end bar toward or away from the pivot of the instrument, and by moving the bar so as to change the position of the pencil or tracing point. When the instrument is used for smaller work the bars are disconnected, and it is used as a common pantograph.

IMPROVED POCKET RIFLE.

Marcus L. McCord, Nashville, Ill.—The object of this invention is to furnish an improved sight for pistols and other firearms, which shall be so constructed that it may be readily extended to the rearward to give a longer range to the sight and greater accuracy of aim. To the rear end of the barrel, or to a projection or support attached to the barrel, is hinged the end of a bar in such a way that the bar may be turned back into a position parallel with its former position. This bar, when turned back, rests upon a support attached to the stock, and which enters a guide socket formed in the bar. The bar is made of such a length that when turned down upon the barrel its forward end may abut against the forward sight, and may be secured in place by a spring catch attached to the bar, and which engages with the recessed rear side of the said sight. Thereafter sight, when the bar has been turned down upon the barrel, enters a transverse groove in the barrel. The bar may be pivoted to the rear end of the barrel, so that it may be swung around from one position to the other; or it may be slid into a dovetail groove in the upper side of the barrel.

IMPROVED COMPOSITION FOR DRESSING COTTON YARNS.

William H. Perkins, Fall River, Mass.—The dressing consists of unslacked lime, sal soda, soap, and water, and is prepared in the following manner and proportions: Two and one half pounds of unslacked lime, two and one half pounds of sal soda, one ounce of common soap, and one gallon of boiling water, which are thoroughly stirred together until the parts are mixed. Five gallons of salt water are then added, and the whole left standing for twenty-four hours, when the compound is ready for use. It is applied in the same manner as other dressing, but is considerably cheaper. It imparts a bright and glossy finish to the fabrics dressed therewith, and stands unchangeable in any weather or atmosphere.

IMPROVED HOSE COUPLING.

Frederick Stewart, St. Louis, Mo., assignor to himself and Oscar F. Scudder, of same place.—This invention relates to an improved hose coupling that is tightly connected with the hose ends, so as to resist a considerable pressure on the coupling parts with less liability to blow out or disconnect the hose ends, as the connection of coupling and hose will be drawn tighter the greater the pressure exerted thereon. The interior sleeve of the coupling is made with a slight taper. The hose end is placed in position on the same, and rigidly secured thereon by a diagonally split and tapering band, having a screw thread cut on the outside, and by an outer sleeve, with corresponding taper, having an interior screw thread. The screwing up of the outer sleeve on the split band closes the latter, and clamps the same and the hose tightly on the inner sleeve. The clamping or wedge connection of the inner sleeve, split band, and outer sleeve with the intermediate hose end produces a tight fastening of the hose, that gets tighter the greater the pressure, so as to remove any liability to blow out by the pressure of the water on the coupling.

IMPROVED BED PAN.

Clark S. Merriman, New York city.—In this invention the ordinary bed pan is used, to one side of which an air cushion is attached. The airspace in the annular part is separate from that in the cushion. When the device is used it is placed under the body, and one or both parts are inflated, as may be required. The cover is then placed in position with the pocket in the cavity of the bed pan. After use the cover may be removed and cleaned and replaced; or two may be used in alternation. The advantages claimed for this improvement are that the body is supported in an elevated position, so that the excrements, when ejected, will not flow down the back. It is more comfortable to use, and is easily cleaned.

IMPROVED COMBINED CANE AND UMBRELLA.

Thomas F. Darcy, New York city.—This invention consists in a combined umbrella and cane, formed of the ribs, the handle, the stretchers,