

The Probable Distance of the Sun.

A particularly good opportunity of determining the distance of the sun, by observations of the planet Mars at its opposition, occurs in August and September of the present year, the planet being about that time in perihelion, or nearest the sun in its eccentrically elliptic orbit, within a fortnight of its being in opposition to him from the earth. The result of this is that in the early days of September, Mars approaches us to within a distance of about thirty-five millions of miles. Advantage will be taken of this near approach to obtain a value of the solar parallax and distance; and all astronomers wish good-speed to Mr. David Gill, who is now proceeding to the Island of Ascension for that purpose, taking with him an excellent heliometer belonging to Lord Lindsay, and made use of by him in observing at Mauritius the transit of Venus over the sun's disk, in December, 1874. With this instrument, Mr. Gill proposes to make observations of Mars and neighboring stars for comparison, when east and west of the meridian, so as to deduce the parallax of Mars from its parallactic change of position in the interval, owing to the diurnal rotation of the earth. This method has been suggested before, and partially carried out (but not sufficiently to obtain a reliable determination by it) at the last favorable opposition of Mars, in 1862. That opposition, however, was utilized very fully in another way, by making a large number of meridian observations of the planet at stations in both the northern and southern hemispheres, so as to give parallactic displacement at different places, instead of different times. The most complete discussion of all these observations was made by Professor Newcomb, of the United States Navy, and published by him as an appendix to the Washington Observations for 1865. The final result he arrived at from them was the value 8''·855 for the solar parallax. We will compare this with that obtained by the transit of Venus. The observations made of the transit in 1874 have not yet been fully reduced, and it would be premature to make use of them till the reductions are completed. The last preceding transit of Venus was that of 1769, about some of the observations of which there was, for a considerable period of time, a misunderstanding, which led to their being supposed to give a much smaller parallax and larger distance than was fairly deducible from them. This was particularly the case with regard to the observations made at Otaheite (or Tahiti) by Captain Cook and Mr. Green, as was satisfactorily pointed out in 1868 by Mr. Stone, now Astronomer-Royal at the Cape of Good Hope. His improved reduction of all the observations of duration of transit in 1769 gave 8''·91 for the solar parallax; and we may reasonably give this a weight of half, in combining it with the result obtained by the opposition of Mars in 1862, to conclude what may now be considered the most probable value of the sun's parallax and distance. Such combination gives for the parallax the value 8''·873; and as sun's distance = earth's equatorial semi-diameter (*i. e.*, 3962·5 miles) \times co-tangent equatorial horizontal parallax, we thus obtain 92,113,600 miles for the present most probable mean distance of the sun. It will be interesting to see how this agrees with the value to be derived from the last transit of Venus and the forthcoming opposition of Mars, when the reductions of both are completed.—*King's College Magazine.*

Japanese Fans.

The folding fan is a Japanese invention. Even to this day the fan forms an integral portion of the national costume of Japan, and plays a large part in the every day life of that country.

An almost fabulous number of fans are exported from Japan to all parts of the world; no fewer than 3,000,000 fans, valued at \$90,000, were shipped from Hiogo and Osaka in 1875. Osaka is the principal city for the manufacture of the "ogi," or folding fans, which are almost exclusively those exported, all descriptions of the bamboo kind being made there, the figures, writing, etc., being executed in Kiyoto. The principle of division of labor is carried out a long way in this branch of industry. The bamboo ribs of the fans are made by private people in their own houses, and combinations of the various notches cut in the lower part are left to one of the finishing workmen, who forms the various patterns of the handles according to plans prepared by the designer. In like manner the designer gives out to the engravers the patterns which he thinks will be saleable, and, when the blocks have been cut, decides what colors are to be used for each part of the design, and what different sheets are to be used for the opposite sides of each fan.

When these sheets, with the sets of bamboo slips which are to form the ribs, have been handed over to the workman, he, in the first instance, folds them so that they will retain the crease. This is done by putting them between two pieces of heavily oiled paper, which are properly creased. The fans are then folded up together, and placed under pressure. When sufficient time has elapsed, the sheets are taken out, and the mould used again, the released sheets having been packed up for at least twenty-four hours in their folds. The ribs, which are temporarily arranged in order on a wire, are then taken and set in their places on one of the sheets, after it has been spread out on a block and pasted. A dash of paste then gives the woodwork adhesive powers, and that part of the process is finished by affixing the remaining piece of paper. The fan is folded up and opened three or four times before the folds get into proper shape, and by the time it is put by to dry, it has received an amount of handling which Japanese paper alone would endure. When the insides are dry, the riveting of the pieces

together—including the outer covering—is rapidly done, and a dash of varnish quickly finishes the fan.

The sale of fans in the olden time in Japan seldom exceeded 10,000 for the whole country; times have changed however, for the foreigner has set foot there, and the old days of seclusion and limited trade are over. The number of fans ordered for the Philadelphia Exhibition alone amounted to over 800,000, at a cost of about \$50,000.

The designs for the mounts of Japanese fans are sometimes of a very interesting description, and always strikingly unlike the productions of European art. One peculiarity of the art of Japan has been pointed out by a recent critic. If a Japanese artist has any space to adorn, he does not seek out the center and place his ornament there, for although that would be the obvious means of securing proportion, it would not satisfy a taste directly derived from a study of nature, where proportion is rather suggested than expressed. We find, therefore, that the Japanese artist, imitating the ways of nature, throws his design a little out of the precise balance and trusts to the spectator to judge of the result by an association of impressions similarly derived.—*Harper's.*

Resistance of Wires.

This is a subject on which several series of researches have been made, but the results have been discordant. Thus MM. Becquerel, Siemens, and Matthiessen, with comparatively good agreement, have found in the case of copper, silver, gold, iron, and platinum, a diminution of resistance through annealing. M. Mousson, on the other hand, in the case of steel wires hardened by extinction, also obtained a decrease of resistance through the softening; but in steel wires, which were hardened by drawing, as also in copper wires, he got an increase of resistance through annealing.

With a view to explain this discordance, and to examine the behavior of a large number of metals, M. Chwolson, of the St. Petersburg Academy, has investigated the action of softening through annealing (either by means of a strong electric current or a gas flame) on the galvanic resistance of hard-drawn wires of 15 different metals—namely, platinum, platinum-iridium, palladium, aluminum, aluminum-bronze, iron, steel, copper, brass, German silver, zinc, silver, lead, magnesium, and cadmium. The last of these gave no distinct results, whereas, in the case of all the others, the question was answered unequivocally. We will not here further describe M. Chwolson's method, but merely give the results of the measurements in the following table, in which under A is represented the maximum of the observed change of the resistance in consequence of the first glow; under B the maximum of the resistance-change at a strong glow; and under C the greatest change of the resistance at extinction, all explained in percentage of the original existence of the hard drawn wires:

Wire.	A.	B.	C.
Steel.....	-4·8 p.c.	+8·6 p.c.	+0·6 p.c.
Iron.....	-0·4	+5·3	+0·7
Brass.....	-8·3	+0·8	+1·0
Copper.....	-2·9	+1·4	+0·4
Platinum.....	-5·3	+5·8	+0·7
German silver.....	-1·1	+2·0	-1·8
Aluminum bronze.....	-8·0	—	+2·7
Palladium.....	-0·4	—	+0·1
Platinum-iridium.....	-3·2	—	+0·3
Silvercopper alloy.....	-11·3	—	+1·7
Zinc.....	-1·8	—	—
Aluminum.....	-1·9	—	—
Lead.....	+0·5	—	—

We see from this table that, in the case of twelve out of thirteen metals, the galvanic resistance is diminished in the softening of the wires in consequence of the first not very strong glow; only lead forms an exception, showing a slight increase. On increased and strong glow, six metals showed a distinct increase of the resistance; consequently an effect opposite to that of the softening. This double action of glow, in the case of some wires—for example, iron—where the decrease through softening is slight, and the increase through increased glow is strong, can only be observed by very careful measurements. That the second action is not simply to be attributed to an oxidation of the wire, is shown clearly by the high value obtained for platinum (with strong glow the resistance again rose above its original amount), and the comparatively very small value found for brass and copper. In extinction of the wires in water, lastly, nine out of ten metals showed an increase of the resistance, and only brass (German silver?) showed a considerable diminution of it.

The double action of annealing here demonstrated sufficiently explains the contradictions in the results of previous investigators.—*Der Naturforscher.*

Inventions Patented in England by Americans.

- July 19 to July 30, 1877, inclusive.
 BOOTS AND SHOES.—C. Edwards, Jamaica, N. Y.
 CARDING ENGINE.—R. F. Barker (of Boston, Mass.), Manchester, Eng.
 DRYING FRUITS, ETC.—A. J. Reynolds, Chicago, Ill.
 ELECTRICAL MACHINE.—T. A. Edison, Menlo Park, N. J.
 EYELET.—James Whitehead *et al.*, Cranston, R. I.
 FILE HOLDER.—Nicholson File Company, Providence, R. I.
 FURNACE.—W. Stewart *et al.*, Paterson, N. J.
 HOP PICKING MACHINE.—H. G. Locke, Waterville, N. Y.
 LOOM.—E. J. Bicknell, Providence, R. I.
 RAILWAY CARRIAGES.—E. P. Kellogg, New York city.
 ROCK DRILL.—A. A. Goubert *et al.*, New York city.
 SEPARATING PRECIOUS METALS.—A. K. Eaton, Brooklyn, N. Y.
 SIGNALLING.—J. L. Plimpton (of New York city), London, Eng.
 SPINNING RINGS.—F. Rabeth, Providence, R. I.
 SPINNING MACHINERY.—John Good, Brooklyn, N. Y.
 SPRING MATTRESS.—T. L. Snyder, Montclair, N. J.
 STOP NOTCHES.—H. A. Lugin *et al.*, New York city.
 TYPE-DISTRIBUTING MACHINE.—D. Reynolds, Albany, N. Y.
 WHEELS.—James Bowson *et al.*, South Pittsburg, Tenn.

Recent American and Foreign Patents.

Notice to Patentees.

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NEW MECHANICAL AND ENGINEERING INVENTIONS.

IMPROVED PIPE COUPLING.

Rufus H. Moss, Salem, Oregon.—The object of this invention is to provide a coupling for uniting pipes used in conveying hot air for heating cars, that may be quickly coupled and readily uncoupled. It consists of a cylinder attached to the end of the pipe that conveys the heated air. In this cylinder a tube is placed which is provided with a flange or collar which fits the cylinder, and is packed to insure an airtight joint. A spring presses against a collar and throws out a tube provided with catches, which seize and retain the collar of the coupling to be united. The parts of the coupling are alike on each end of the car, and when the parts on adjacent cars are united, the catches of one part engage the flange of the other. The tube and flange move longitudinally in the cylinders, as the cars move toward or from each other in running, and when the couplings are detached the valve closes automatically, preventing the escape of air.

IMPROVED PROCESS AND APPARATUS FOR COATING METAL ROLLERS.

Henry Wilde, Manchester, Eng.—This invention consists in a method of securing a sufficient amount of adhesion between the iron and deposited copper surfaces to enable the roller to withstand the various engraving and other operations without the separation of the metals. For this purpose the iron roller, before receiving a coating of copper from a hot cyanide solution of copper, is heated to a temperature ranging from 150° to 212° Fah. by plunging it into boiling water, or by other means. The roller, after receiving a film deposit of copper from the cyanide solution, is then transferred to the bath containing a sulphate solution of copper, where it receives one or more thin coatings of copper. These coatings are subjected to considerable pressure by the action of a burnishing roller of hardened steel, for the double purpose of forcing the deposited copper into closer contact with the iron, and detecting any want of adhesion between the two metals. The burnished coppered roller is then replaced in the bath of sulphate of copper solution, and subjected to the action of the electric current until the desired thickness of copper deposit is obtained. Attempts have been made from time to time to substitute iron rollers covered with a thin layer of copper by means of electricity for the solid copper rollers used in calico printing, and in other processes; but, owing to the expense of the battery power and the slow rate at which the copper was deposited in the reguline state, such attempts have not hitherto been commercially successful.

IMPROVED FOLDING GRATING FOR WINDOWS.

Calvin T. Steckel, Brooklyn, N. Y.—This invention is intended as a substitute for the fixed iron gratings or bars in basement store, and other windows, so as to provide a shutter that may be folded and turned, making the room more cheerful, and facilitating the cleaning of the windows, etc., while combining, when locked, the same degree of safety as the bars, and is a combination of a folding lazy-tong shutter with a fixed and slotted hinge of the window casing, to fold and turn the shutter. The folding shutter is burglar-proof, furnishing the same protection as the fixed grating, but giving, in addition thereto, the great convenience of opening them during the day, and presenting a neater appearance without the objectionable features of the rigid bars.

IMPROVED CANAL LOCOMOTIVE.

Gabrielle De Nottbeck, New York city.—This invention has for its object the construction of a locomotive which will practically run in a canal, the rails or track being laid upon the bed of the canal, and the body of the locomotive raised above the water and mounted upon standards, to which the driving and transporting wheels are applied. Canal boats have been propelled by means of locomotives or traction engines which run on the sides of the canals; but the power in such instances was oblique to the length of the boats, and the resistance was very great; but this locomotive is designed to run in a canal, and in a direct line with the boat which it draws. In practice the body of the locomotive will be entirely out of the water, and it will be provided with a hook at each end for the attachment of a boat.

IMPROVED LEATHER CRIMPING MACHINE.

Jason Smith, Charlestown, Mass.—This invention consists in the arrangement, in a suitable frame, of a tree or form rigidly supported by standards attached to a crossbar of the frame, and in plates that slide in grooves in the standards, one upon either side of the tree, and carry wedge-shaped or beveled pieces having the same curvature as the tree or form. It also consists in a clamping device for clamping the leather, and carrying it down over the tree, and in smoothing plates for pressing the leather smoothly upon the tree, and in levers and screws for operating the various parts.

IMPROVED BALANCED VALVE.

William Hardwick, Erie, Pa.—This invention relates to certain improvements in balanced valves of that class in which the two parts of the valve are made adjustable toward or from each other. Said improvements consist mainly in the arrangement of a stuffing box through which the bolt connecting the parts of the valve passes, and the arrangement of springs in connection with the bolt and the two parts of the valve for the purpose of holding the latter in proper position.

NEW MISCELLANEOUS INVENTIONS.

IMPROVED CURRYCOMB.

Thomas D. Bennett and Horace B. Moody, Harrisonville, Mo.—This invention relates to an improved currycomb for horses, and consists of rotary combs, and an arc-shaped stationary comb, attached to a suitable handle. The crossbar may be plain or provided with teeth on upper side, to serve as a mane and tail comb. The rotary combs raise the hair and admit the stationary comb to enter with great facility, so as to effectually clean the skin.

IMPROVED TOY BUZZ.

James B. Wells, Cincinnati, O.—This invention has relation to a toy known as a "whirligig;" and it consists in a thin circular plate or disk surrounded by leaves or semi-circles so shaped and arranged that when rapid rotation is given to the disk a whistling sound is produced. This toy will be struck out of very thin sheet metal, and scraps of tin may be utilized for the purpose.

IMPROVED BRUSH.

Randall Bisbee, New York city.—The object of this invention is to improve the construction of metallic brushes, so as to enable them to be made lighter and neater, and adapt them to receive any desired kind of a back. Wires take the place of ordinary bristles, and are placed through a rubber plate, with their heads resting against the inner side of the plate. A leather plate is placed over the heads of the wires, and between them