

A New Gold Salt for Toning.

BY DR. J. SCHNAUSS.

Until now there have been used only the single and double chloric salts of gold for toning. During the past winter Mr. Neumayer, student of chemistry from Munich, visited my establishment and undertook under my directions the preparation of a gold bromide and a gold bromide of calcium, for the purposes of experimenting with these salts and their uses in photography.

Thin leaves of gold are readily dissolved in bromine water and in bromine gas. But a more rational and less disagreeable mode of preparation is by the action of hydrobromic acid, nitric acid, and aqua-regia.

During the evaporation of the gold bromide, which has a dark appearance and smells strongly of bromine, great care is necessary, owing to the fact that the gold bromide vaporizes more easily than the chloride. Bromide of gold is difficult to crystallize. By the addition of an exact equivalent of bromide of calcium dissolved in water, and evaporated, small granite-red crystals of double salts are obtained. $KBr + AuBr_3 + 5H_2O$ can be with difficulty dissolved in water; but a thin solution is of a deep red color, and effloresces in dry air.

I have tried these double salts, also the gold bromide, with several additions as a toning bath. In its general effect on silver copies it is analogous to gold chloride combinations, except that in the same proportions it acts more energetically.

The addition of soda bicarbonate gives a blue-black tone, melted acetate of sodium a purple colored tone.

For a lasting gold bath, in form of a *sel encoussé*, these salts are recommended.—*Archiv.*

How to Prepare Photographs for Printing Blocks.

In the *Photographisches Archiv* appear the details of a simple method of securing an outline photograph in metal suitable for printing with type in the ordinary printing press. It is necessary to be somewhat of a draughtsman, no doubt, in order to be able to do the work well and rapidly, although nothing is said on this head, but hardly any one could, hap-hazard, undertake the matter.

Only a well marked photograph with bold lines, and in which minor details are of no account, is suitable, and the negative is in the first place put into a camera or other apparatus to furnish an enlarged positive. Upon this enlarged positive are traced, in Indian ink, the bolder lines which it is desired to retain, a pen or brush being employed for the purpose, according to the nature of the work or the desire of the draughtsman. After all details have been in this way traced, with thoroughly black pigment, the lines of a thickness corresponding to the original object, and of such a nature as to be readily reproduced by photography, the print is treated with chloride of lime or other bleaching agent, and in this was the whole of the image obliterated with the exception of the block lines made by the draughtsman.

The picture is now photographed, and in this way a small negative secured, or one, at any rate, of the dimensions of which the printing block is to be. In this case the negative will be perfectly opaque in the lights and transparent in the shadows, and from it may be easily produced, by any of the etching processes, an engraving upon zinc capable of being used in the printing press with type.

Chloride of lime is specially mentioned as the bleaching agent wherewith to render invisible the details of the silver image, after the draughtsman has done his work. We should think that a solution of bichloride of mercury would be much more effectual in making the original photographic image disappear.

Aluminum.

In a recent meeting of the Miners' Union at Freiberg, Professor Winkler described some experiments made to measure the power which aluminum possesses of resisting external influences. Tablespoons made of aluminum, of silver (75 per cent), and of German silver of best quality, were the subjects of experiment. They were in the same daily use, and were weighed at regular intervals. These spoons were purposely brought into contact with the greatest variety of food, and each time after using were rubbed with soap, washed in hot water, and rinsed with cold water. They were also occasionally washed with a dilute solution of carbonate of soda, so that they were in daily contact with hot and cold acid and alkaline liquids.

In the course of time there was a change in the appearance of the spoons. The aluminum, which at first was a beautiful white, lost its brightness and acquired a dead, bluish-grey color; the German silver also lost its brightness, while its color changed to a disagreeable greyish-yellow; the silver stood best, as it only lost its polish, but remained comparatively white. Repeated weighings showed an average annual loss in weight of:

0.630 per cent for aluminum,
1.006 " " German silver,
0.403 " " silver;

so that if it were possible to use them until entirely used up, a silver spoon would last 248 years, one of aluminum 158 years, and one of German silver 99 years.

The spoon form was selected merely because it offered the best opportunity for measuring the amount of chemical and mechanical loss in comparison with other metals and alloys tested. The results of these experiments showed that aluminum is not nearly so easily attacked as has hitherto always

been supposed, but is more like zinc; and if it could be made at a low price, it might be employed for a great variety of purposes.

NEW BOOKS AND PUBLICATIONS.

LIGHT—A SERIES OF SIMPLE EXPERIMENTS, ETC., by Alfred M. Mayer and Charles Barnard. D. Appleton & Co. 549 and 551 Broadway. 1877.

There have been so many attempts to popularize scientific experimenting, that we took up this little book with some curiosity as to the new guise in which we were sure Dr. Mayer would present his experiments. The way in which that curiosity is gratified is to us very satisfactory. The experiments are capably selected and equally as well described. In fact the book is conspicuously free from the multiplicity of confusing directions clear enough to the writer but not to the reader, with which works of the kind too often abound. Beginning with the heliostat and its simple construction, Dr. Mayer takes up the phenomena of reflection, refraction, and decomposition of light, giving a few—and carefully avoiding too many—experiments in each branch, which are the best suited to fix the particular principle under study. Complicated and expensive apparatus is avoided, and everything needed for the entire course may, we are told, be bought for 15 dollars. There is an abundance of excellent illustrations, and Mr. Charles Barnard, who describes the various experiments as they were produced before him, has certainly ably supplemented Dr. Mayer's work. Altogether the book is very commendable, and especially so to the readers of the SCIENTIFIC AMERICAN.

A TREATISE ON ENGINEERING CONSTRUCTION. By J. E. Shields, C.E. New York: D. Van Nostrand & Co., Publisher, 23 Murray street. Price \$1.50.

A plainly written clear and readable little book, which owes its value to the fact that it is claimed to be the results of the author's own experience gained in a professional practice of many years. It deals with practical subjects throughout. There are chapters on sand, concrete, caissons, pile driving, etc., under foundations—a division is devoted to masonry, another to tunnels and the last to engineering geodesy. An excellent work for young students in the profession, and a handy book of reference for any civil engineer.

THE RAILWAYS OF NEW SOUTH WALES. A report on their Construction and Working from 1872 to 1875 inclusive. By John Rae, A.M., Commissioner for Railways. Published by the Government, Sydney, N. S. W.

Mr. Rae's report shows with much clearness the advantages accruing from investing capital in railways well managed and opening up a new and growing country to commerce. At the end of the four years noted there were 437 miles of road in the colony in operation and an additional length of 25 1/4 miles in progress. The expenditure for rolling stock, machinery shops, etc., had been about \$32,895 per mile—48 per cent of the earnings were spent in maintenance and working. For every mile open the earnings were \$7,495—the expenditure being \$3,610 and the net earnings \$3,885. The net earnings show an increase of 10 per cent for the year 1875 over that of the year 1871. A supplement to the report gives detailed descriptions of the lines and works of construction, which will be found of value to railroad civil engineers for purposes of reference and study.

MANUAL OF THE RAILROADS OF THE UNITED STATES FOR 1877. By Henry V. Poor. 10th series. Published by H. V. & H. W. Poor. 68 Broadway, New York.

Poor's manual gives as usual a valuable and very full compilation of statistics relative to all the railroads of the country, showing their present status and also their history during 1876. The past year, we learn, has been one of great depression in the railway business although the aggregate results of all operations has been "fairly satisfactory." The number of miles of road opened during the year was 2,356 against 1,919 miles for 1875, 1,911 miles for 1874. This increase is due to activity in the Southern Pacific lines and in narrow gauge lines in Ohio, Texas, and Colorado. No new lines of any magnitude have been undertaken. The gross earnings of the business have fallen off \$5,807,546, and the net earnings have increased \$945,314, the latter owing to the economies practiced in operating the roads. Their information regarding the various lines covers financial condition, property, etc., with much detail. There is a valuable appendix showing State debts and liabilities.

A TREATISE ON THE USE OF BELTING FOR THE TRANSMISSION OF POWER. By John H. Cooper, M.E., Philadelphia. Claxton, Remsen, & Haffelfinger, 324 Market street

A thorough and complete treatise on the subject of belting has been needed by mechanical engineers for a long time. Information on the subject, of which there has been no lack, has remained scattered through the files of this and other journals or has appeared in the shape of chapters in works covering very much wider ground. Hence the matter of belting has not obtained that exhaustive treatment which its importance really warrants for it, and hence we are more gratified to see so well qualified an engineer as Mr. Cooper undertake and carry the task to a successful completion. The only blemish—if it indeed be one at all—is that his work is too full; original papers are quoted in abundance where perhaps condensation would have better suited the needs of the practical reader while the risk of repetition might have been avoided. But as a whole the book is excellently well compiled from a large number of sources. The best and newest of all on the subject has been culled. Practical hints and suggestions abound, there is a multiplicity of rules, recipes, and useful tables, and an ample supply of good woodcuts.

Inventions Patented in England by Americans.

From July 31 to August 6, 1877, inclusive.

AXLES.—B. T. Babbitt, New York city.
BARBED WIRE FENCE.—H. W. Putnam, Bennington, Vt.
BOOK.—E. S. Boynton, New York city.
EXTRACTING WORT FROM MALT.—R. d'Heureuse, New York city.
FIRE ARMS.—E. T. Starr, New York city.
GAS APPARATUS.—W. W. Batchelder, New York city.
PLUMBER'S TRAPS, ETC.—J. E. Folk, Brooklyn, N. Y.
PUNCHING AND SHEARING MACHINE.—D. Brickner, New York city.
SEWING MACHINE.—L. R. Blake, Boston, Mass.
SHOE MACHINERY.—H. G. Thompson, Milford, Conn.
TELEGRAPH INSTRUMENT.—T. A. Edson, Menlo Park, N. J.
TOOL HOLDER.—E. F. Bengler, Williamsport, Pa.

Recent American and Foreign Patents.

Notice to Patentees.

Inventors who are desirous of disposing of their patents would find it greatly to their advantage to have them illustrated in the SCIENTIFIC AMERICAN. We are prepared to get up first-class WOOD ENGRAVINGS of inventions of merit, and publish them in the SCIENTIFIC AMERICAN on very reasonable terms.

We shall be pleased to make estimates as to cost of engravings on receipt of photographs, sketches, or copies of patents. After publication, the cuts become the property of the person ordering them, and will be found of value for circulars and for publication in other papers.

NEW HOUSEHOLD INVENTIONS.

IMPROVED SHADE HOLDER.

Gustavus H. Reck, Bethlehem, Pa.—This invention relates to an improved shade holder that adapts itself to any shape of burner, with iron, brass, lava, or other tip of a larger size than the body; and the invention consists of a shade holder having arms and springs fastened by their bent ends into a U-shaped collar or ring. The springs produce a firm fitting of the shade holder to the burner without being liable to get shaky or loose, as the arms and springs are attached without solder, and retained firmly by the binding action of the collar or ring, forming thus a strong, durable and tightly fitting shade holder.

IMPROVED LAMP BRACKET.

John Forster, Coal Valley, Ill.—This invention relates to an improved safety lampstand for sewing machines, pianos, organs, and other purposes, and consists of a base part clamped or screwed to the table of the sewing machine or other object, and provided with a detachable standard and oil cup stand, the standard having an adjustable stand and collar for the lamp, and a pincushion at the top.

IMPROVED RECIPROCATING CHURN.

Daniel A. Fiske, St. Louis, Mo.—When the dasher of this churn is raised the wings turn down, permitting the dasher to rise easily through the cream. When the dasher is forced downward the wings are thrown up, and the inclined surfaces of the various portions of the dasher cause the cream to rotate. The upward motion of the dasher checks this rotation. The intermittent rotary motion of the cream is effective in separating the milk and butter, and the same motion tends to unite the particles of butter.

IMPROVED WRINGER.

Edwin Banfield, Jermyn, Pa.—This machine is designed for use as a wringer and as a mangle upon table linen, bedclothes, and other plain articles that are free from buttons, hooks and eyes, and other fasteners. The invention consists of the combination of wringer rolls, of a bevel guide to transfer the waste water where it is guided by cleats into a tub, and inclined tables or levers, to which the guides and cleats are attached. When the machine is to be used as a mangle, the table, with the cleats, is inverted, and the tables are adjusted in a horizontal position.

IMPROVED ROTARY CHURN.

William Knaggs, Richview, Ontario, Canada.—The object of this invention is to furnish an improved churn dasher which shall be so constructed as to bring the butter very quickly, and gather it quickly and thoroughly. The dasher rod is made square, passes through square holes in the centers of crossbar, and its end revolves in a step or socket attached to the bottom of the churn body. The other end of the rod is enlarged, passes through a bearing, inserted in a hole in the top of the churn body, and attached to or formed upon a small plate secured to the top. By this construction, when the dasher is turned forward the milk is drawn inward by the bars, is forced through the opening between their inner edges, and strikes against the inclined bars, by which it is divided and thrown in opposite directions. When the dasher is turned backward the rear sides of the bars act as paddles or ladles for gathering the butter.

IMPROVED ROTARY CHURN.

Honoré G. Fougeu, Cape Girardeau, Mo.—This invention relates to a new motive power which is especially designed for mixing liquids, for churning butter, and for other purposes where a rapid and alternate rotary motion is found useful. The aperture may be made small enough to fit an ordinary tumbler, or can be constructed on a scale large enough for churning butter or washing fabrics. The upper end of a spindle has a bearing in a handle, which is screwed fast upon the cap. The lower end of the spindle is screw-threaded to receive the shaft of a dasher, which may be of any desired form. Between the upper end of the dasher shaft and the top of the cap a balance wheel is applied, on the tapering part of the spindle, and confined by friction, so that in the event of the dasher meeting with a resistance which would be liable to injure the machine the said wheel will slip. Inside of the cap is fitted a collar which may be made of sheet metal, and which is constructed with a circular flange that receives upon it a cylinder. The collar will prevent fluids from getting inside of the cap. The cylinder is designed to prevent fluids which are being agitated from flying out of the vessel containing them. The machine is operated by means of a strong chord, which is wound around the pulley on a spindle, and which may be held in the hand or attached to a lever, and guided by a pulley. This improved agitator will be found very useful for mixing all kinds of fluids, for churning, making ice cream, beating eggs, washing fabrics, and for many other purposes.

NEW MECHANICAL AND ENGINEERING INVENTIONS.

IMPROVED CORN PLANTER.

William M. Steel, White Day, W. Va.—This invention consists in the combination of the U-shaped iron bars with the axle of the sulky, to adapt it to receive the operating parts of the machine; and in the combination of the bar, the hopper or hoppers, the dropping slides, the spring bar, the stud, and the block or blocks with the U-bars and the axle and wheel of the sulky. To the rear side of the axle are bolted the forward arms of two U-shaped iron bars, within which is secured a wooden bar. To this bar is attached a long hopper, or two short hoppers, to receive the seed, and from which the seed is removed by dropping slides which have holes formed in them of such a size as to contain enough seed for a hill, and pass through slots in the front and rear sides of the hopper. The forward ends of the dropping slides are pivoted to a spring bar, one end of which is attached to a stud attached to the axle near one wheel, and its other end projects so as to be struck by a block or blocks attached to the spoke or spokes of the other wheel. The slides are kept from carrying out any more seed than enough to fill their dropping holes by rubber blocks attached to the forward side of the hopper. The seed drops from the slides, through holes in the bar, into the conductor spouts, attached to the lower side of the said bar, and upon the lower ends of which are formed, or to them are attached, points to open the soil to receive the seed and points to cover the seed. The spouts are connected by a rod, so that their lower ends may be adjusted to plant the rows wider apart or closer together. The distance apart of the hills is regulated by the number of blocks attached to spokes of the wheels. The amount of seed dropped for a hill is regulated by using slides with larger or smaller dropping holes.

IMPROVED STONE-QUARRYING MACHINE.

John B. McRae, Mount Holly, Ark.—The object of this invention is to work the large quarries of soft white stone which are found in Texas and other States, and which produce a very useful building material, by a machine which is designed to cut the stone in the quarry directly into blocks of the required size in a quicker and more economical manner than with the present slow and tedious methods of quarrying them; and the invention consists of a car with a steam engine or other motor driving a vertical and adjustable front saw, a horizontal and adjustable saw back of the same, and a third vertical rear saw, at right angles to the front saw, to divide the long pieces of stone cut from the bed into blocks of the required size. The rear saw is made vertically adjustable by a suitable lever and guide arrangement. A car of suitable size is propelled to the place of work on a track laid in the quarry. The car is provided with a steam engine or other motor, by which the cutting saws are revolved and the car moved forward while the machine is in operation. The car is moved up along the bed of stone as the cutting progresses. At the front part of the car is placed a vertical saw, of suitable diameter, that cuts down into the bed of stone.

IMPROVED HYDRANT VALVE.

Frederick Shriver, Grand Rapids, Mich.—The object of this invention is to construct a hydrant valve that cannot freeze or become obstructed so as to be inoperative. Above the valve seat openings are made through the sides of the part of the valve that projects into the supply pipe and passages are formed in the projections on opposite sides, which extend downward below the casing to permit the escape of waste water. The valve consists of a follower, which is reduced in diameter to receive the packing which caps over its end and extends upward to the shoulder, which is undercut to retain the edges of the packing. Below the packing a centrally perforated disk is placed, which is provided with a lip around its outer edge that projects downward. Below the disk there is a leather or rubber