

THE BLACKSMITH AND HIS FORGE.

There is now on exhibition in this city a remarkable painting, "The Blacksmith" (Le Forgeron), by the late Hubert E. Delorme, who died in Paris in 1894. Mr. Delorme was born at Givors, in the Rhone district, France, in 1842. From early life he had the artistic impulse. He went to Paris while still a young man, and through his innate industry and skill soon made himself a place in the world of art. He exhibited at both salons. His works are remarkably realistic. "The Blacksmith," the painting which we reproduce in half tone, is the most notable of his works. It embodies two features, involving very delicate handling and a fine appreciation of the different qualities of light. The sturdy smith stands gazing at the iron in the fire, which is nearing the proper heat. The ruddy glow of the forced fire is seen and the radiated heat is felt by the spectator as it is realized that both the heat and the light are received in full force on the face, neck, and arms of the blacksmith, who patiently waits, tongs in hand, for the iron to heat. The sparks and the color of the fire show that the fuel used is charcoal. Smoke circles around the forge, and dust, cobwebs, cinders, scraps, and tools are in their natural places.

An open door and a dusty window on the left let in bursts of sunlight, while another window—not seen—

graph taken with an ordinary plate, and without a yellow screen, shows the fire dark, and the firelight is shown as a shadow rather than illumination; but with orthochromatic plates and the yellow light sifting screen everything was perfectly rendered excepting a slightly exaggerated illumination on the sunlit portions and the surfaces illuminated by diffused daylight alone. This slight defect was corrected by flowing on the back of the negative a thin coat of orange lacquer and, after it became dry, removing with alcohol portions opposite the places lit by daylight, thus screening the main part of the negative while the sunlit portions were allowed an increased exposure.

Much difficulty was experienced in securing an angle of illumination which would prevent the reflection of light from the ridges of the brush marks. This was especially true in the case of artificial illumination, in which also uniformity of illumination proved a problem. To avoid the first difficulty, the light was allowed to strike the canvas at a low angle, so as to cause the stray light to be reflected away from the field of the lens, so as not to affect the plate. Uniformity of illumination was secured by burning the magnesium torch on either side of the camera as near the canvas as possible without bringing it into the field of view.

The best results, however, were secured by daylight.

fullegal tender silver at \$3,430,300,000, stock of limited tender silver at \$681,200,000, making a total silver stock in the world of \$4,070,500,000; the uncovered notes are placed at \$2,469,500,000.

An Important Patent Decision.

By a decision filed Dec. 2, in the United States Circuit Court of Appeals, third circuit, a previous decision of the New Jersey Circuit Court was reversed, and patents 291,784 and 291,785 of Augustus Schultz, of Brooklyn, N. Y., were sustained. These patents are for a method of tannage of light leathers, styled the chrome tannage, which has become of great importance in the leather trade within the past five years. In glazed kid for ladies' shoes, which formerly constituted a considerable item in our imports, the home production of chrome tannage almost entirely supersedes goods made in the old way, the imports now being very small, and our kid finishers having already obtained considerable export trade. In the production of colored calf and morocco leather this process has also met with success, the chrome tanned leathers being of greater toughness and affording better resistance to moisture, and thus having increased wearing capacity.

Nearly one thousand printed pages of testimony were taken on both sides of the case, and it was argued



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admits diffused daylight. Here, then, are three kinds of light flooding the shop and illuminating the figure, but still the light is all in perfect harmony. The different lights do not nullify each other, as one might suppose they would, but rather enhance the effect so as to bring out the figure of the blacksmith with wonderful relief against the remote depths of the shop. The flesh and muscles of the man have a texture belonging to a blacksmith. It requires no effort to feel that there is life in the picture. None of the details are slighted; the anvil and the hammer have an appearance which comes from continual use. The scale and cinders upon and around the anvil block show that the day's work is already partly done, and yet nothing in the picture has the appearance of having been overwrought.

Our engraving is a very successful reproduction in half tone of a most difficult subject, and is as faithful as anything in black and white can be. Orthochromatic plates were used and a yellow screen was interposed in the light beam between the lens and plate. The lens employed was a fine Zeiss anastigmat, and impressions were made both by daylight and artificial light.

The difficulties in the way of securing correct color values will be appreciated when it is known that the light of the forge fire is orange, with a tendency to red, while the daylight illumination has the true bluish cast characteristic of strong actinic light. A photo-

An exposure of thirty minutes was required to bring out all the detail. This necessitated the use of a restrainer in developing.

Gold and Silver.

The Director of the Mint has submitted his report to the Secretary of the Treasury, covering the operations of the mints and assay offices of the United States during the last fiscal year.

The value of gold and silver estimated to have been used in the industrial arts during the calendar year 1894 was approximately \$21,541,652, of which \$10,658,604 was gold and \$10,883,048 was silver.

The estimated metallic stock in the United States on July 1, 1895, was: Gold, \$636,229,825; silver, \$625,853,949, a total of \$1,262,083,774. The estimated product of gold and silver in the United States during the calendar year 1894 was: Gold, 1,910,813 fine ounces, of the value of \$39,500,000; silver, 49,500,000 fine ounces, of the commercial value of \$31,422,000 and of the coining value of \$64,000,000.

The estimated production of the world for the calendar year was: Gold, 8,737,888 fine ounces, of the value of \$180,626,100; silver, 167,732,565 fine ounces, of the coining value of \$216,892,200, of the commercial value of \$106,522,900.

Mr. Preston gives an estimate of the approximate stock of money in the principal countries of the world. He places the gold stock at \$4,086,800,000; the stock of

before the Circuit Court at Trenton, N. J., in the spring of 1894. The principal defense raised in the suit was the alleged insufficiency of Mr. Schultz's specifications, and certain prior patents and publications, which were said to describe the same invention. After holding the case under consideration for nearly a year, Judge Green handed down a decision in favor of the defendant, holding that the Schultz patents were anticipated, and therefore invalid. An appeal to the Circuit Court of Appeals was at once taken, and the appeal was argued before Judges Acheson, Dallas, and Butler, in Philadelphia, last September. The points discussed in the appeal were similar to those in the Circuit Court. On the 2d inst., the Circuit Court of Appeals handed down its decision, which was written by Judge Dallas for the court, reversing Judge Green's decision and deciding in favor of the patents, both as to the alleged insufficiency of specifications and as to anticipation by prior published processes. The claim that the decision is unappealable and irreversible is based on the statute which invests in the Circuit Court of Appeals the final jurisdiction in patent cases.

Thousands of dollars have, according to the Shoe and Leather Reporter, been spent in this litigation. Expert testimony has been given by such conspicuous scientists as Dr. C. F. Chandler, of Columbia College, New York; Prof. Samuel P. Sadtler, of the University of Pennsylvania; Arthur D. Little, chemist, Boston; Dr. Henry Morton, of Stevens Institute, Hoboken.

Bleaching Cotton Piece Goods.

Cotton piece goods are bleached in different ways, according to the use to which they are to be put. The operation is generally performed in such a way that the singed and washed piece is first passed through a lime bath of 5 lb. of lime to 100 lb. of goods. The material is next washed, acidulated with hydrochloric acid, $\frac{3}{4}$ to $1\frac{1}{2}$ ° B., then boiled—4 lb. soda, 2 lb. resin, and 1 lb. caustic soda being used per 100 lb. of goods; washed again, and treated in a chloride of lime bath of $1\frac{1}{2}$ to 2 lb. chloride of lime per 100 lb. of material; acidulated with hydrochloric acid, $1\frac{1}{2}$ ° B.; again washed, and then dried. Attempts have often been made to combine the processes of chloring and acidulating, but without satisfactory results, the pieces so bleached having a yellow tinge after washing. In many bleaching establishments the liming process and the boiling are united, the cotton pieces being boiled in a lime and soda solution.

In large cloth printing houses the cotton pieces are singed first, then washed, limed, acidulated, washed again, and afterward boiled out twice with soda, caustic soda, and resin. The quantity of ingredients to be used for the boiling operation depends on whether the cloth is to be treated in the open or closed vat, under pressure, and, if the latter, the quantity of caustic soda is decreased. After boiling from 6 to 12 hours, the pieces are washed in the washing machine, then entered into the chloride of lime bath, next taken out and entered direct into the acid bath, in which they remain for a short time, after which they are washed again and dried. All these operations are performed by the continuous process—that is to say, the pieces are stitched together at the ends and are passed in rope form through the different baths in succession. To remove any remaining chlorine, the washed pieces are passed through a cold solution of bisulphite of soda, and again washed. In the continuous process, care must be taken to pass the washed cloth through a vessel containing diluted spirits of hartshorn, in order to remove every trace of free acid. To bleach 100 lb. cotton cloth, a lye consisting of 10 lb. lime and 10 lb. calcined soda is prepared, allowed to settle, and the clear fluid is poured into the boiling-out vat. The cloth is then entered into the suitably diluted lye, and boiled from 6 to 8 hours, after which the liquor is allowed to run off, and the cloth is cooled with cold water. Next, the goods are thoroughly acidulated with hydrochloric acid, $\frac{1}{2}$ to 1° B., and washed in the

washing machine. For 100 lb. cloth, the chlorine liquid is prepared from $1\frac{1}{4}$ to 2 lb. chloride of lime, rubbed in water, in a perforated drum, into a fine milk, then strained, and the cleared liquid is used for bleaching. The chloride of lime bath is started with cold water, the prepared cloth being immersed in it from 6 to 8 hours, after which it is taken out and acidulated in a cold bath with hydrochloric acid of 1° B.; then washed and dried.

The addition of a little petroleum naphtha to the boiling-out bath has been recommended, in order to increase the cleansing effect, which process has proved quite efficient; in this case, however, the boiling water must not contain lime, but only caustic soda, resin, and soda. If this mode of cleansing is adopted, the cotton cloth is first treated in the lime bath, then acidulated and washed, and afterward entered into the boiling-out bath.

It is necessary in bleaching cotton cloth to distinguish between the so-called market bleach and the printing bleach. The first does not require the addition of resin soap, although when it is used the white obtained is always clearer and brighter, but the second bleach does. It is well known that print cloth bleached without resin soap or not sufficiently boiled out prints badly and that a clear white on it is impossible, but the co-operation of the dissolving resin is indispensable for the print bleach, because, besides the natural impurities of the cotton that remain in the cloth, there are those resulting from the weaving, etc., which are removed by the resin soap.

Experiments for bleaching cotton cloth with peroxide of hydrogen have been quite successful, but it has been found that this method is too expensive. It has, therefore, not been generally employed, except for very fine cotton cloths, the price of which can include a suitable charge for bleaching.

The electrolytical bleaching methods have lately been regarded more favorably; the Hermite mode, the oldest, has had to stand many attacks, and it is still doubted whether it can be used on a large scale. The more recent methods by electrolysis are all based upon decomposing a solution by electrolysis and bleaching the cloth with it, but it is not yet known what would be the result in actual practice, as such a plant requires the outlay of much capital. The latest bleach method—Siemens—i. e., by the use of ozone, is still too much a matter of experiment only to be able to express an opinion here, the views regarding its practicability differing most widely. It is stated, how-

ever, that by the use of the Siemens apparatus, it is possible to generate 20 grammes ozone per horse power per hour. This is a very small quantity, but when one considers what an immense effect can be produced by it, one is almost forced to conclude that, in the near future, the bleaching of cotton cloth with ozone will be attempted in the cotton goods industry.—*Farber Zeitung.*

The Maximum Depth of the Ocean.

A sounding has recently been taken in the Pacific Ocean, near the coast of Japan, which showed a depth of 29,400 feet, or approximately $5\frac{1}{2}$ miles. This is a little more than the height of the loftiest mountain, Mount Everest, which is situated in the Himalaya range, to the north of India.

How much deeper the Pacific is than this it is impossible to tell; the wire having broken, presumably through its inability to sustain its own weight. In a previous attempt to reach the floor of the ocean at this spot, the wire broke at a depth of 25,800 feet. It has been suggested, as one theory of the formation of mountain ranges, that they represent the crumpling up, or buckling, of the earth's crust under the severe contraction strains that were set up as the surface of the globe solidified.

If this be true, the deep ocean valleys or gorges, such as this off the coast of Japan, must be the result of the same action. Taken in connection with the loftiest mountain, this sounding gives a difference in distance from the earth's center of about twelve miles, or $\frac{1}{11}$ of the earth's radius.

The Thermophone.

This is an electrical apparatus in which sounds are produced by the changes in the circuit due to variations of temperature. Its use is to measure temperature, particularly the temperature in a distant or inaccessible place; at the bottom of a pond, for instance. For obtaining deep sea temperatures it is useful, and it may also prove of great service in the ventilation of buildings, for by this instrument the temperature of any room in a building can be registered on a dial placed in the hall. The scientific uses of the thermophone are obvious, and it will be of great aid to physicists in determining the fluctuations in the temperature of the soil and the difference in temperature between the water at the surface and that at the bottom of ponds or lakes.

RECENTLY PATENTED INVENTIONS.**Engineering.**

FURNACE.—Milton T. J. Ochs, Allentown, Pa. This is a furnace especially designed to utilize as fuel tan bark, mill refuse, and similar material. A series of transverse arches is arranged in step-like order above the grate, their adjacent edges overlapping and spaced apart to form lateral openings for the products of combustion to pass between the arches, there being in the furnace walls flues whose lower ends open into the ashpit below the grate while their upper ends open into the fire box below the arches.

Railway Appliances.

CAR COUPLING.—Robert T. Dressler, Buchanan, Mich., and Velimir Timitch, Hastings, Neb. According to this improvement the coupler has its drawhead pivotally connected with the draw bar for a horizontal oscillatory movement, and the draw bar is pivotally connected to the car frame and held in engagement with adjusting and locking devices whereby the bar may be adjusted vertically. The coupling is automatically effected when the drawheads come together, the uncoupling being effected from the top or sides of the car, and the coupling members being positively held from jumping up when they engage.

FARE BOX.—Le Roy C. Godwin, Portsmouth, Va. This is a box adapted to be supported from the body of the conductor by a shoulder strap for the reception of fares, the coin after having been placed in the box being still visible. There is also a purse or storage chamber for the final reception of the coin, provided with a suitable locking device. The throat or inlet of the box is so made that a coin may be readily passed in, but cannot afterward be fished out.

Miscellaneous.

BICYCLE DRIVING GEAR.—Dan Gregory Bolton, Cooperstown, N. Y. This is a changeable gear, light, strong and simple, for driving a wheel with more power and slower speed up a hill or on rough road, or at a greater speed on a level. The change from one gearing to the other is readily made by means of a hand lever, without inconvenience to the rider, and the construction is designed to combine the maximum of strength with the minimum of weight.

BICYCLE BELL.—I. N. Hopkins, Lockport, N. Y. This improvement combines a bicycle handle and alarm bell, which can be readily placed on the handle bar instead of one of the ordinary handles, and be operated by the thumb of one hand. The handle is tubular, and at its outer end is a metallic ring integral with a yoke which supports the bell, whose rim is near but not in contact with the end of the handle, the external form of the bell conforming to the curvature of the handle, and forming a properly rounding finish for the handle end.

WALL TELLURIAN.—Grant B. Nichols, Wapakoneta, Ohio. This is an apparatus adapted to be folded against a schoolroom wall, to take up but little

space, and comprising an inclined table with apertures arranged in an ellipse to represent the path of the earth, a second series of apertures representing the path of the moon with respect to the earth, a rod in a central aperture carrying a ball representing the sun, while ball-carrying rods represent the earth and moon, these rods to be at any time inserted on the proper date in their respective apertures, to show the relative positions of the sun, earth, and moon. The invention also comprises other valuable features designed to facilitate the work of teachers.

INDEX CUTTER.—Frederick C. Mohner, Goshen, Ind. For cutting the index sheets or leaves of books this inventor has devised an apparatus to be easily operated by an inexperienced person, doing the work with great precision and rapidity. The book whose leaves are to be cut is placed on an adjustable platform, when the leaves are laid on a die and beneath a presser foot, and, by stepping on a treadle, a cutter head is moved down to cut the leaves. The platform may be automatically fed lengthwise to bring successive leaves in position to be cut.

COPYING BOOK.—Edwin Fowler, Kansas City, Mo. This is a letter press book having a series of sheets forming surfaces receptive of copying ink for press copying, the sheets bearing consecutive numbers or letters in copying ink, which numbers are transferred to letters copied. By this means copied letters may be conveniently designated and found in the copying book.

HYDROCARBON BURNER.—Jacob W. Rees, Cleveland, Ohio. This burner is adapted to burn either oil or gas, producing the gas from oil, and is provided with an asbestos-lined drip pan adapted to be set in the fire box of an ordinary cook stove. Burners being supported on standards above the drip pan to bring the flame to the proper position. Oil burned on the drip pan generates gas in a generator supported above the pan when the apparatus is employed as a generator and burner.

TYPEWRITER ATTACHMENT.—William S. Bigelow, Boston, Mass. This invention provides a simple device by which the key when depressed will be held down, as when upper case or figure printing is to be done, the key being released by a natural and easy movement of the hand and finger, when such printing is finished, to throw the machine into normal position. An independent spring catch is adapted to engage and project above the key to hold it depressed, the key being released by a wiping or drawing movement of the operator's finger.

PHOTOGRAPHIC SHUTTER RELEASER.—Arthur M. Boos, Boston, Mass. To automatically release the shutter, in time or instantaneous work, enabling the photographer to be away from the camera while the exposure is made, this inventor has provided a device for pressing the shutter-releasing button, the device being normally held out of contact by a fuse string, the time of burning of which regulates the duration of the exposure.

MUSICAL INSTRUMENT.—Lewis E. Pyle, Elam, Pa. This invention relates to mandolins,

guitars, etc., and provides an instrument designed to be rich in melodious tones, while it is arranged to prevent bending of the neck, and formed to fit properly on the body to facilitate executing the music. The body of the instrument is approximately heart-shaped, and the tail-piece is located in the recess at the base of the instrument, being thus protected from contact with any surface on which the instrument may be placed.

FISH POND.—Charles Braaf, New York City. This is primarily an apparatus to afford amusement, comprising a pond or aquarium in which artificial fish may be placed and kept constantly moving to represent life, the water being also in motion. The construction is such that a single attendant may wait on visitors, and a stand is also provided for the display of prizes, each fish being numbered and the prizes being for successful fishers.

BEDSTEAD.—Andrew Stratton, Augusta, Wis. This is an improvement in bedsteads which have legs that fold and provided with casters for easy movement. A supplemental frame is arranged to telescope on the bed frame, and prop legs pivoted on one frame have their ends arranged to engage the other frame, there being means to hold the prop legs in adjusted position. The bedstead, when not in use, may be made to take up but little floor space.

BATH TUB.—Elizabeth G. Smith, New York City. This invention provides a tub which may be readily moved from place to place and conveniently set up, the tub having a collapsible frame, the bottom and auxiliary sides of which are formed of a sheet of waterproof material, the sheet having stiffened edges adapted to pouring water therefrom, while removable fastening devices hold the sheet in engagement with the upper edges of the frame.

STOVE.—Mark W. Foster, Pocatonia, Ill. In heating stoves which have a horizontal damper or diaphragm dividing its interior into two compartments, this invention provides an improved construction, there being a slidable horizontal damper in the combustion chamber with a central opening directly beneath the pot hole, there being an independently slidable plate for closing the opening. Special means are also provided for suspending and rocking the grate.

VEHICLE RUNNING GEAR.—James Duncan, Adelaide, South Australia. This invention provides for the employment of a special spring bed extended so as to also form a draught bar, at the two ends of which are lugs or joints which are fitted to and receive the shaft ends or pole bracket ends, the joints being above the springs. The improved construction, which is applicable to buggies and other four-wheeled road vehicles, is designed to obviate a great deal of friction, wear and rattle.

VEHICLE CURTAIN.—Frank Lane, Newark, Ohio. For buggies, phaetons and similar top carriages, this invention provides a curtain arranged to be easily and quickly operated to open or close the sides of the vehicle, the improvement comprising a tubular casing or socket in which is journaled a spring-pressed roller carrying the curtain.

THILL COUPLING.—Frank W. Warner, Angelica, N. Y. This coupling has a clip plate with transverse slotted socket in which is held the shank of the thill iron, screw bolts across the ends of the socket bearing on the ends of the shank. The clip plate is formed of a single piece of sheet metal having one end wider than the other, the opposite sides of the wider end having opposite wings oppositely perforated.

TRUSS.—Joseph Fandrey, Santa Barbara, Cal. This is a device for the support and reduction of hernia, and designed to be specially adapted for the cure of abdominal ruptures, while being easy to wear and not liable to shift from its position.

Designs.

PUMP CASING.—Aquila B. Marshall, New York City. This design shows a casing especially designed for a bicycle air pump, and having a cylindrical portion and a broadened end.

BADGE.—Charles A. Barker, New York City, and Frederick L. Green, Long Island City, N. Y. This design simulates an elephant in profile and in front view, while a spur from the back forms a support.

CHRISTMAS TREE ORNAMENT.—Victor A. De Prose, San Francisco, Cal. This design affords a decoration made to represent a conventional flower or lily.

NOTE.—Copies of any of the above patents will be furnished by Munn & Co., for 25 cents each. Please send name of the patentee, title of invention, and date of this paper.

NEW BOOKS AND PUBLICATIONS.

PHOTOGRAPHY: ITS MATERIAL AND APPLIANCES. With some remarks for the use of non-proficients on their choice and application. London: John Birch & Company, Limited. 1895. Quarto. Pp. 140. Profusely illustrated. Price \$3.

This work is issued for circulation in foreign countries and especially in the British colonies, and is issued by the well known firm of merchants and engineers, who do a large commission and manufacturing business. The first part of this work is devoted to descriptions of photographic apparatus and directions and formulas for working various processes. The second part is devoted to a priced catalogue of photographic apparatus. It is rather extraordinary to make buyers pay for a trade catalogue; it is, however, an English custom. The reading matter in the front occupies only 128 pages and is hardly worth the price charged—seven shillings and sixpence.

AMERICAN STEAM AND HOT WATER HEATING PRACTICE. New York: The Engineering Record. 1895. Pp. 317. Large 8vo. Profusely illustrated. No index. Price \$4.

This is a selected reprint of important articles which have appeared in the Engineering Record, a journal of