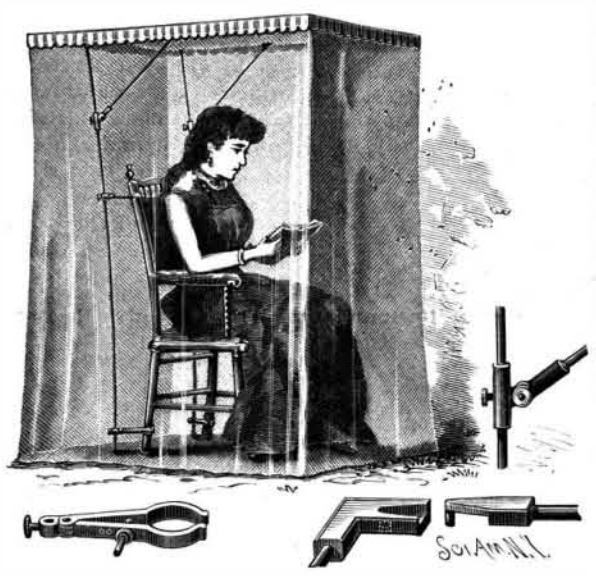
in its upper face, its lower edge being formed of cam faces, operated by a crank arm. The open end of the cartridge is first depressed by a claw or pronged piece adapted to engage with the thread of the plunger, so that it will enter the annular groove in the upper face of the crimping block, when by a slight downward pressure on the lever, at the same time rotating the crank arm, the edge of the shell will be further turned over and properly crimped.

Photography as a Detective.

Photography is gaining prominence in the criminal courts. With its help a Berlin merchant was lately convicted of crooked ways in keeping his accounts. The slightest differences in color and shade of inks are made manifest in the photographic copy. Blue inks appear nearly white; brown inks, on the contrary, almost black. A contemporary states that the books of the accused were submitted to a photographer, who took off the pages concerned and brought into court the most undoubted ocular proofs of the illegitimate after-entry of some of the accounts. A subsequent chemical test substantiated this evidence. The photographic is to be preferred to the chemical test, because it brings its proofs into the court, and submits them to inspection, at the same time leaving the document under examination unharmed; while the results of a chemical test must be taken on the evidence of the chemist alone, and the writing examined is perhaps destroyed. In another case similar to the above, the changing of the date of a note by an insignificant erasure and addition was proved by means of photography.

AN IMPROVED CANOPY DEVICE FOR CHAIRS.

A frame to support an awning, canopy, or mosquito netting, which can be quickly and easily secured to



SMITH'S CANOPY ATTACHMENT FOR CHAIRS, ETC.

and detached from a chair, settee, etc., and is especially designed for use as a screen for protection against mosquitoes, etc., at all watering places and mountain resorts, is illustrated herewith, and has been patented by Miss Almira A. Smith, of Hadley, Mass. (box 140). The frame proper is composed of two standards, two side pieces, two end pieces, and two braces, which may be made of wood, but are preferably nickel plated metallic rods.

The standards are adapted to be detachably secured to a chair or settee by means of clamps, such as shown in the small figure to the left in the illustration, the small figures to the right showing corner pieces of the top frame, and the manner of adjusting the braces on the standards. An awning cloth of waterproof material is attached to the top frame, and, when used in localities infested with mosquitoes, a suitable netting is suspended in such manner as to wholly inclose the space beneath the frame. The construction is such that the frame can be accommodated to any irregularities of the ground, and the whole can be quickly taken down and folded in compact form to be readily carried in the hand of the user.

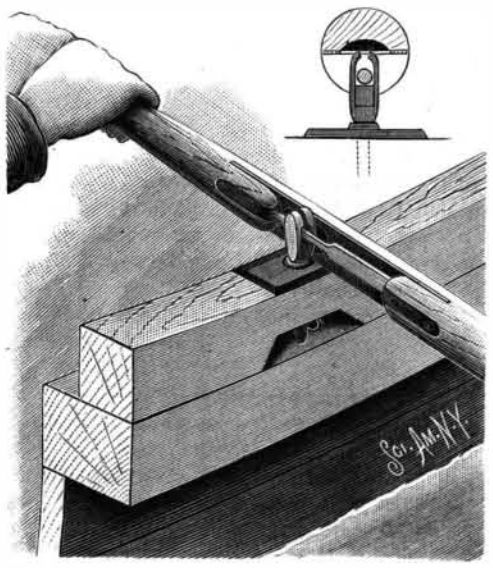
The Hoosac Tunnel, North Adams, Mass.

The total length of the tunnel is 25,031 feet, or four and three-fourths miles. It is 20 feet in height and 24 feet in width. From it was excavated 1,900,000 tons of rock. Its entire cost was $14,000,000. It is soon to be lighted by electricity.

THE SCIENTIFIC AMERICAN needs no one to "sing its praises," but, notwithstanding this fact, we feel it an absolute duty to the general public, at least that portion of it which has never seen or heard of the paper, to tell them that such a one is published at the low price of $3 a year, and that its true value cannot be overestimated. It stands at the head of all publications of its kind.—*Amer. Art Printer.*

AN IMPROVED OAR AND OAR LOCK.

A novel construction, whereby an oar will be held securely in the oar lock, while turning freely therein, forms the subject of a recent patent, and is illustrated



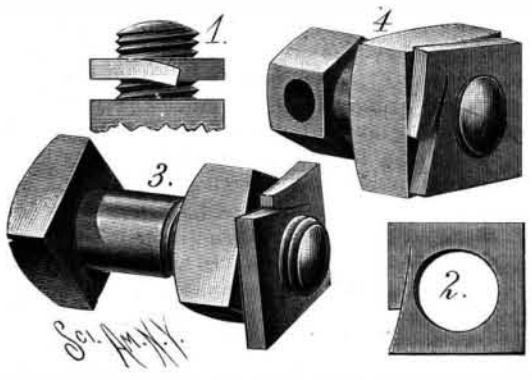
PHEATT'S OAR AND OAR LOCK.

herewith, the small figure showing a sectional elevation of the oar and oar lock. In a space formed by a cut-away portion of the oar is fixed a metal rod to fit in the oar lock, this rod being so attached that there will be no projections on the oar. At the bottom of the space formed by cutting away the oar is fitted a strengthening plate. The rod is round for about half of its length, the other portion being flattened to adapt the rod to be readily placed in and removed from the narrow slot or opening of the rowlock, which is formed with a shank that enters the rail, and a plate secured thereto in the usual manner. The top of the lock is divided to form two opposite members, between which the rod is held to fulcrum the oar, the upper ends of the members approaching each other at the top to form a narrow slot. The oar is limited in its outward movement, and in reversing the direction of rowing, it has simply to be turned over the top of the lock.

For further particulars with reference to this invention, address the inventor, Mr. Gideon K. Pheatt, of No. 120 Locust Street, Toledo, Ohio.

AN IMPROVED NUT LOCK.

A nut lock which partakes of the functions of a jam nut, and which may in some instances take the place of a nut already in use, is illustrated herewith, Fig. 2 showing a plan view, and Figs. 1, 3, and 4 illustrating different applications. The invention consists in a nut whose inner periphery is threaded, and whose body portion is cut entirely through with a slit parallel to the axis of the bolt, a portion of the body thus cut being depressed or pushed out of the normal plane of the nut, so as to act as a stout spring bearing against the other nut when screwed up. The tension of this spring, when the jam nut is screwed up, creates so much friction that neither of the nuts can turn without turning the other, while the strain is so unequal as to prevent them from acting in unison. The cut in the jam nut may also be semicircular, or nearly so, terminating at either end in the body of the nut, and not extending to the edge. This invention was patented in December, 1886, and the nut has been thoroughly tested and has given satisfaction. For



VAUGHAN'S NUT LOCK.

further information relative thereto address the Vaughan Manufacturing Co., No. 41 South Front Street, Philadelphia, Pa.

Annealing Small Tools.

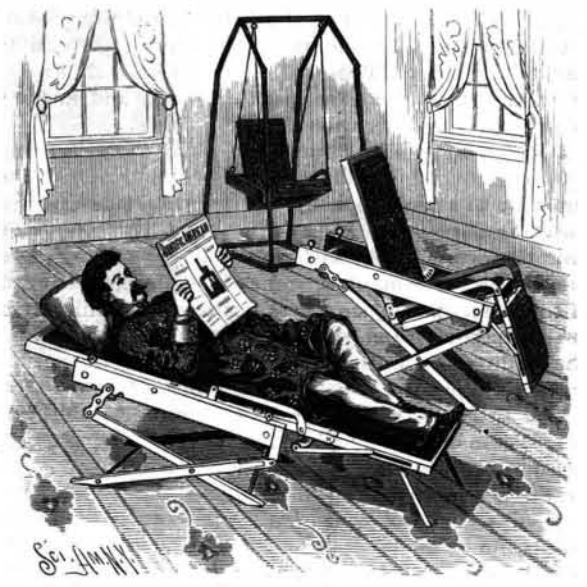
According to the *English Mechanic*, a very good way to anneal a small piece of tool steel is to heat it up in a forge as slowly as possible, and then take two fireboards and lay the hot steel between them and screw them up in a vise. As the steel is hot, it sinks into the pieces of wood, and is firmly embedded in an almost air-tight charcoal bed, and when taken out cold will be found to be nice and soft. To repeat this will make it as soft as could be wished.

Paper for Cleaning Lenses.

Prof. S. H. Gage, of Cornell University, recommends, as preferable to linen or chamois skin, the so-called Japanese filter paper, the bibulous paper often used by dentists in filling teeth. It is soft and flexible, absorbs liquids readily, is less likely to contain gritty particles that are liable to scratch the lenses, and it is so inexpensive that when a piece has once been used it may be thrown away. Every director of a microscopical laboratory appreciates the difficulty of getting students to exercise the proper care in cleaning objectives and eye pieces. Every large laboratory is sure to contain some students whose genius for scientific study is exhibited chiefly in the careless handling of delicate apparatus. Doubtless if in a microscopical laboratory each student were provided with a quantity of this paper, fewer valuable lenses would be injured.

AN IMPROVED ADJUSTABLE CHAIR AND SWING.

A chair, in which the position of the back seat and foot rest may be changed at pleasure, and the chair be readily varied in height as desired, while it may also be quickly transformed into a couch, or adapted for use as a swing, forms the subject of a recent patent, and is illustrated herewith. Besides a main frame of novel construction, three separate frames are provided, constituting respectively the back, seat, and foot rest, hinged together, the seat being adapted to fold upon the back, and the foot rest upon that side of the seat not in contact with the back. There is a crank to make continuous the reclining action of the back and seat, whereby also the foot rest may be made to work in unison with the back and seat, or be released to fold under the seat. The foot rest is also detachable, so that it can be placed out of the way without inconvenience to the user. The normal height of the chair may be lowered to that desired for a lady's sewing chair, retaining the reclining position, and, with



BASTIAN'S ADJUSTABLE CHAIR AND SWING.

the extension of the foot rest, the chair may then be made to form a couch. Discarding the legs by folding them underneath the frame, provision is made to use the contrivance, suitably hung, as a swing, which will be comfortable and secure, and peculiarly adapted for children's use. As is obvious, the construction, as a chair and chair and swing, presents facilities for a great variety of changes. Entirely folded up, it forms a rectangular package of small compass capable of easy transportation and storage.

For further particulars with reference to this invention, address the patentee, Mr. Charles Bastian, No. 36 Howard Street, New Orleans, La.

The Electro-Crystallization of Metallic Copper.

BY H. N. WARREN, RESEARCH ANALYST.

The apparatus made use of for the above mentioned substance consists entirely of an open tube, closed at one extremity by means of a bladder diaphragm, and suspended in a solution of dilute sodium chloride. Into the tube is introduced a saturated solution of cupric sulphate, the strength of the solution being maintained by the insertion of a smaller tube terminating in a point, and containing crystals of $CuSO_4$. A strip of copper foil, about 3 inches long by 1 inch wide, is next introduced into the copper solution, and connected by means of a copper wire to a plate of zinc, forming the negative electrode and in contact with the salt solution. After the lapse of a few hours small cubical crystals of metallic copper gradually begin to appear on the copper electrode, which in the course of a week or more will have arranged themselves into a compact crystalline mass, possessing a full metallic luster, and rivaling in purity and malleability the finest specimens of native copper, which they much resemble. Metallic silver, antimony, bismuth, zinc, and even aluminum, magnesium, iron, chromium, and all the more oxidizable metals, may by slight alterations be reduced to the metallic state.—*Chemical News.*