moved around a post. In one of its edges the post has notches. A stretcher-head comprising a ring moves along the lever and is adapted to engage any one of the notches. A bar is arranged at right angles to the lever and has connection with the ring. Hook-bolts are mounted in the bar; and tightening-nuts are carried by the bolts. The device can be conveniently employed for stretching and twisting the ends of a broken wire.

ENVELOP.—JAMES A. ULLMAN, Manhattan, New York city. The purpose of this invention is to provide an envelop which can be opened very much more readily than the ordinary envelop. To this end an orifice is formed in the sealing-flap, through which orifice the blade of a knife may be inserted to cut the envelop open. In order to render the insertion of the knife-blade easy, a notch is cut in the back of the envelop just under the opening, so that the blade will have a clear passage into the interior of the envelop.

ADJUSTABLE DRESS-CHART.—HARRY C. WILSON, Manhattan, New York city. The inventor has devised a series of adjustable patterns which can be readily set according to measurements, so as to obtain proper patterns for ladies' waists. The principal aims of the invention are to simplify the adjusting operations, to provide a construction that will positively give the full outline of each piece, and to enable the dressmaker to vary the pattern.

BOTTLE.—WILLIAM A. FRIES, SR., Brooklyn, New York city. This invention relates to non-refillable bottles. Mr. Fries has been chiefly concerned with providing a bottle which is both practical and cheap and which is so constructed that the refilling of the bottle will be effectively prevented by means of a novel valve inserted in the neck. Many non-refillable bottles cannot be made by the ordinary methods of blowing and molding. The present invention, however, is primarily designed to overcome these difficulties of manufacture.

DRAWING AND MEASURING INSTRUMENT.—CELESTIA E. KERR, Decatur, Ga. The invention relates to an instrument for use in drawing, measuring, and working with various sorts of materials. The instrument comprises a scaled ruler, a T-square, a protractor, and a compass.

SILK-CLAMP.—JAMES J. MCGRATH, Brookhaven, Miss. The clamp is adapted to bind a bolt of silk and to retain the folds in proper position for exhibiting the goods. Main clamp-arms and auxiliary inner clamp-arms exert a clamping action at two distant points. The inner clamp-arms are of such form as to prevent them from making an impression on the silk when several bolts are superposed.

PIPE-ELBOW BRACE.—SAMUEL C. BROWNFIELD, Elmo, Mo. The pipe-elbow brace is formed in two sections adjustably connected, each section further comprising a clamp to engage the pipe, such clamps lying at angles to the sections so as properly to dispose the brace. By this construction a brace is provided which is adjustable to suit the form of the elbow.

TOOL-HANDLE.—ANTRIM L. WHITE, Springville, Iowa. Mr. White has provided a hammer or like tool to which a handle may be conveniently attached. Engaging the head is a metallic tube, into which a plug is forced to grip the interior walls, so that it is held in the head. A hand-piece is fastened to the outer end of the tube; the tube and the hand-piece jointly form the tool-handle.

TROUSERS-STRETCHER.— JOHN C. TATMAN, Victor, Colo. The trousers-stretcher consists of two cross-pieces, between which the legs of the trousers are clamped, and a central piece connecting the two cross-pieces. The central piece can be so adjusted that the cross-pieces are forced apart to stretch the trousers.

DISPLAY-STAND.—ISAAC STEINAU, Manhattan, New York city. The inventor has received both a mechanical patent and a design patent for a portable display-stand, which is intended to receive collar-buttons. The mechanical patent shows a bowl-body together with a transparent sectional cover for the body, the sections being capable of sliding one over the other. A stem serves to hold the parts of the cover loosely in position, and to prevent them from leaving the body. The design patent shows the bowl formed as a turned-down collar and the stem as a collar-button.

TACK-PULLER.—CHARLES A. EVANS, Haverhill, Mass. The tack-puller comprises a handled fork having spring arms, and a pair of spring-jaws fulcrumed between the arms and normally open. The spring-jaws are arranged to close by applying pressure and to open automatically upon removing the pressure, so that the tack pulled may drop out to permit the tool to be used again.

Designs.

VIOLIN-BRIDGE.—SAMUEL G. DONNELLY, Augusta, Ga. The leading feature of the design is an arched hook-shaped upper or head section of the bridge, which head-section at its left hand is connected by a shank with the base-section of the bridge.

BELT.—LOUIS SANDERS, Brooklyn, N. Y. The design provides an ornamentation resembling a collar located at the central or back portion of the belt.

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

Business and Personal.

Notes & Queries

HINTS TO CORRESPONDENTS.

Names and Address must accompany all letters or no attention will be paid thereto. This is for our information and not for publication.

References to former articles or answers should give date of paper and page or number of question.

Inquiries not answered in reasonable time should be repeated; correspondents will bear in mind that some answers require not a little research, and, though we endeavor to reply to all either by letter or in this department, each must take his turn.

Buyers wishing to purchase any article not advertised in our columns will be furnished with addresses of houses manufacturing or carrying the same.

Special Written Information on matters of personal rather than general interest cannot be expected without remuneration.

Scientific American Supplements referred to may be had at the office. Price 10 cents each.

Books referred to promptly supplied on receipt of price.

Minerals sent for examination should be distinctly marked or labeled.

(8026) W. H. T. asks: 1. Is the voltage of a circuit reduced by inserting resistance in series with the source of energy? A. No. 2. How is the voltmeter to be read—in series, or as a shunt with the resistance? A. The voltmeter is always connected as a shunt upon the circuit whose voltage is to be measured. 3. As I maintain the voltage is reduced, am I not right in saying: If the voltage is not reduced by passing the current through resistance, an unlimited number of lamps could be run, for in that case the amperage would not fall (by Ohm's law), therefore the current would remain constant, no matter what resistance was in the circuit? Suppose in a circuit carrying 5 amperes at a pressure of 500 volts, five 100-volt lamps are introduced in series; one lamp will take one-fifth of the pressure, while five lamps all, or 500 volts at 5 amperes? A. The resistance in a circuit has no control over the voltage. The drop between two sides of a circuit is the same, whatever the resistance may be. In a circuit with 500 volts pressure there is a drop of 500 volts between the positive and the negative side, under all circumstances. If across this there be put a wire with 500 ohms resistance, a current of 1 ampere will flow, according to Ohm's law, C equals E/R. If the wire have 100 ohms the current will be 5 amperes, etc., for any other resistance. Now, if you divide the wire into 500 equal parts, starting at the positive side, you will find a drop of one volt for each of the 500 divisions. This is just like going down a flight of 500 steps. You illustrate by the five 100-volt lamps across a circuit. Each of these lamps takes 100 volts drop in itself. The current for such a lamp is about one-half ampere. You cannot get five amperes through five such lamps in series. A current much in excess of a half ampere will burn the lamps out. The resistance of these lamps holds back the current, so that the lamp is not overheated. It is the increase of the resistance which produces the result which you ascribe to the reduction of the voltage, and in the usual direct current system the voltage is not affected by any other element of the current. 4. If this be so, what pressure and current are we going to get on the return (leaving out its resistance) to the dynamo? Will you kindly prove to me whether my statements are right or wrong? A. There must be enough pressure provided to force the current back to the dynamo. This is proportional to the resistance of the return wires. These wires are large and have a small resistance, hence but a few volts are needed to do this work. You must know that in every circuit a drop of voltage is provided for along the line, so that the lamps, motors, etc., get the proper voltage for their resistance, so that they may have amperes sufficient for their work. There are many people who think volts are the working factor of Ohm's law. On the contrary, amperes do the work: volts furnish the pressure to overcome the resistance. We get the expression very frequently: "A current of so many volts." The statement is entirely wrong. A current is measured in amperes, not in volts. Now the drop in voltage along the feeders, both in going from the dynamo to the lamps and the return from the lamps to the dynamo, is given to the circuit in excess of the voltage needed by the lamps. In a large system this excess is furnished by another generator, called a "booster," because it lifts the voltage enough to supply the loss due to the long line. If it were not for this the lamps remote from the station would not get their proper voltage and would not be properly lighted. 5. Also is there any explanation of the fact that when a voltmeter is placed in series with resistance, it reads practically the same voltage as when it is connected with the terminals of the dynamo? A. This statement is not true except when the resistance is so small as to be practically negligible as compared with the resistance of the voltmeter. A voltmeter is wound so that its resistance is enormously greater than that of any line to which it will be attached, so that it may consume but an insignificant fraction of the current. For a current of 110 volts pressure the voltmeter would have perhaps 10,000 to 15,000 ohms resistance. It would then take only about 1-150 ampere. The voltmeter indicates the drop of voltage between the points to which it is connected. If these are the poles of a dynamo, this is the whole voltage of the circuit; if there is a large resistance in series with the voltmeter, then the voltmeter will not indicate the entire voltage of the circuit. For illustration, suppose the added resistance were just equal to that of the voltmeter. The circuit now has a total resistance twice as great as that of the voltmeter; hence the drop of voltage through the voltmeter will be one-half and through the resistance it will be the other half of the voltage of the entire circuit.

(8027) C. P. says: I would be very thankful to you if you could only supply me with the following information, namely: What is the quantity of material that enters into the construction of a modern first-class battleship? Kindly give quantity in weight. You may also give exact dimensions. A. In such a battleship as the new "Pennsylvania," to be built for the United States navy, whose total weight is about 15,000 tons, 1,200 tons represents the weight of the guns and ammunition, etc.; 1,830 tons the motive power; 1,000 tons the weight of the boats, masts, anchors, chains, provisions, personal belongings of officers and crew, etc., leaving say from 5,000 to 5,500 tons as the weight of the hull. This ship is 435 feet long, 76 feet 10 inches in beam, and draws at greatest draught 26 feet; her freeboard above the water is about 20 feet.

(8028) B. O. asks how to give any article made of copper the appearance of old bronze. A. You can treat your copper article with the following:

Vinegar	1	quart.
Ammonia chloride	250	grains.
Common salt	250	grains.
Liquid ammonia	½	ounce.

The salts are first dissolved in the vinegar, and ammonia is added to the solution when it is ready for use. Small articles may be immersed in the solution, then removed, and when one part becomes too dry a paint brush is drawn over it so as to keep all parts uniform. The color should be carefully and uniformly spread. When the copper has taken the desired tint and the liquid begins to dry and to thicken, the wet parts should be dried with another brush having long bristles or hairs, and when this is too wet to use, another is applied, and so on till the whole is dry. The article is then allowed to rest in a warm place till the next day, when a second coating is given in the same manner as the first. The color now assumes a deep tone, and it may be necessary to repeat the operation several times to get a desired shade. After allowing the article to remain twenty-four hours after imparting the last coat, it is finished by well brushing with a soft brush which has been rubbed on a cake of white wax.

(8029) H. B. asks for a little help concerning the formula for the "Toning of Bromide Prints," found on page 408 of the SCIENTIFIC AMERICAN of December 29, 1900. 1. How shall I make the solution of "neutral citrate of potassium?" If, on mixing, it is found to be either acid or alkaline, what shall I add to neutralize it? A. You may be able to purchase neutral citrate of potassium. Test the solution with red or blue litmus paper. If it changes the color slightly from red to blue, the solution is neutral. If it changes it to blue, the solution is alkaline, and may be made neutral by adding citric acid. If solution turns blue litmus paper red, it is too acid, and may be neutralized by adding a solution of potassium carbonate. 2. Further, it says: "Add the sulphate to the citrate, *mix*, and add the ferricyanide," etc. Does this mean to add the sulphate to the citrate before they are in solution, or after? A. All. After.

(8030) S. D. H. writes: In one or two of his articles Mr. Hopkins speaks of tinning the ends of metals so that they may be more easily soldered. How is this operation performed? Also, will you kindly give me directions for making a flux or soldering solution to be used in soldering copper, brass, tin, iron, etc.? A. To tin copper, for making electrical connections, scrape the surface, or clean it with a piece of fine sandpaper, rub it over with pulverized rosin, and apply solder with a hot soldering-iron. Rosin is a good flux for joints between copper, copper and brass, and copper or brass and tinned iron. A flux for iron or steel is made as follows: Dissolve zinc in hydrochloric acid until it will take no more. Add an equal quantity of water. As the fumes of the acid and gas are very corrosive and pungent, this solution should be made in the open air. After a joint is made with the aid of this solution it should be thoroughly washed to prevent corrosion. It should not be used on fine copper wires.

NEW BOOKS, ETC.

OTTAWA, CAPITAL OF THE DOMINION OF CANADA. Ottawa: The Ottawa Free Press. 1899. 4to. Pp. 79. Price 50 cents.

A charming little booklet filled with interesting views of Canada's capital. It is profusely illustrated, and no feature of the city is omitted. An excellent map shows the water powers near Ottawa.

ANNUAL REPORT OF THE STATE GEOLOGIST FOR THE YEAR 1899. Geological Survey of New Jersey. 8vo. Pp. 327.

The admirable reports of the State of New Jersey are very valuable. The forests of the State have been considered as coming within the limits of the investigations and surveys of the Geological Survey, consequently a considerable part of the report is given up to forest matters.

A MANUAL OF ASSAYING. By Alfred Stanley Miller. New York: John Wiley & Sons. 1900. 12mo. Pp. 91. Price $1.

The student is taught his subject by easy grades. The book appears to be a good elementary treatise.

STUDIES, SCIENTIFIC AND SOCIAL. By Alfred Russel Wallace. Two volumes. London and New York: The Macmillan Company. 1900. 12mo. Pp. 532 and 535. Price $5.

These volumes will charm all who are interested in science. Space forbids to give even an outline of the chapters. The first section is devoted to "Earth Studies," with six chapters, then comes "Descriptive Zoology," "Plant Distribution," "Animal Distribution," "Theory of Evolution," "Anthropology," "Special Problems," "Educational," "Political," "The Land Problem," "Ethical" and "Sociological." The essays appeared in the leading reviews of the world. The versatility of the thoroughly trained scientist is admirably displayed in these volumes.

BOTANY. An Elementary Text-Book for Schools. By L. H. Bailey. New York: The Macmillan Company. 1900. 12mo. Pp. 355. Price $1.10.

A most admirable text-book. The author seems to have a great gift for book-making. Botany can be easily made a very dreary subject, but not with the aid of such books as these. The illustrations are very fine and are numerous. Persons desiring to obtain an elementary knowledge of botany would do well to buy this book.

ELECTRIC WIRING TABLES. By W. Perren Maycock, M. I. E. E. London: Whittaker & Company. New York: The Macmillan Company. 1900. 24mo. Pp. 144. Price $1.50.

The book can be carried in the vest-pocket, and for this reason will be found very useful. It is chiefly intended for those engaged in electric light wiring and fitting, but will be found generally serviceable to electrical engineers. The tables while fine are clearly printed.

THE HUMAN FRAME AND THE LAWS OF HEALTH. By Drs. Rebmann and Seiler. Translated from the German by F. W. Kieble, M. A. London: J. M. Dent & Company. New York: The Macmillan Company. 1900. 16mo. Pp. 147. Price 40 cents.

Three people have collaborated to bring forth this little vest-pocket book. The subject seems to be well treated within the rather severe limitations.

THINGS A BOY SHOULD KNOW ABOUT ELECTRICITY. By Thomas M. St. John, Met. E. New York: The Author. 1900. 12mo. Pp. 179. Price $1.

Many of the time-honored cuts make their appearance as usual. The author deals more with the uses of electricity than with experiments.

CONTRIBUTIONS TO PHOTOGRAPHIC OPTICS. By Otto Lummer. Translated and augmented by Silvanus P. Thompson. London: Macmillan & Company. New York: The Macmillan Company. 1900. 8vo. Pp. 135. Price $1.90.

A splendid treatise on the subject by a physicist of note and translated by another of equally great fame. All who are interested in photographic optics should possess a copy of this book, which will certainly prove a standard treatise on the subject.

PLANT LIFE AND STRUCTURE. By Dr. E. Dennert. London: J. M. Dent & Company. New York: The Macmillan Company. 1900. 18mo. Pp. 115. Price 40 cents.

A volume of the "Temple Primers." Many of the essentials of botany are interestingly told. It would make a good introduction to the science.

CHEMICAL TECHNOLOGY; or, Chemistry in its Applications to Arts and Manufactures. Vol. III., Gas Lighting. By Charles Hunt. Philadelphia: P. Blakiston's Sons & Company. 1900. 8vo. Pp. 312. Price $3.50.

The third volume of Grove's and Thorp's well-known book has been written by an English gas engineer. It deals with the subject in a very thorough manner, and the latest phases of the subject are dealt with. While